

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
30 November 2000 (30.11.2000)

PCT

(10) International Publication Number  
**WO 00/71703 A2**

(51) International Patent Classification<sup>7</sup>: C12N 15/11

(21) International Application Number: PCT/IB00/01252

(22) International Filing Date: 3 May 2000 (03.05.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/132,287 3 May 1999 (03.05.1999) US

(71) Applicant: METHYLGENE INC. [CA/CA]; 7220 Fed-  
erick Banting, St. Laurent, Quebec H4S 2A1 (CA).

(72) Inventors: MACLEOD, Alan, R.; 67 Hallowell Street,  
Westmount, Quebec H3Z 2E8 (CA). LI, Zuomei; 22 Oriole  
Street, Kirkland, Quebec H9H 3X3 (CA). BESTERMAN,  
Jeffrey, M.; 51 Gray Crescent, Baie d'Urfe, Quebec H9X  
3V3 (CA).

(81) Designated States (*national*): AE, AL, AM, AT, AU, AZ,  
BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK,  
DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL,  
IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,  
LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT,  
RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA,  
UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent  
(AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent  
(AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,  
MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— Without international search report and to be republished  
upon receipt of that report.

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

WO 00/71703 A2

(54) Title: INHIBITION OF HISTONE DEACETYLASE

(57) Abstract: The invention relates to the inhibition of histone deacetylase expression and enzymatic activity and, in particular, to the inhibition of a specific histone deacetylase. The invention also relates to compositions comprising antisense oligonucleotides and methods of using the same to inhibit a histone deacetylase. Also disclosed are methods for identifying a histone deacetylase involved in induction of cell proliferation, and methods for identifying compounds that interact with and reduce the enzymatic activity of such a histone deacetylase.

## INHIBITION OF HISTONE DEACETYLASE

### RELATED APPLICATIONS

5        This application claims priority from U.S. provisional application serial number 60/132,287, filed on May 3, 1999, which is hereby incorporated by reference in its entirety.

### BACKGROUND OF THE INVENTION

#### Field of the Invention

10        This invention relates to the inhibition of histone deacetylase expression and enzymatic activity.

#### Summary of the Related Art

15        Deacetylation of the core histones H1-H4 is mediated by a two related families of enzymes called the histone deacetylases. One family of histone deacetylases includes HDAC-1, HDAC-2, and HDAC-3. A second family of histone deacetylases includes HDAC-4 (formerly HDAC-A), HDAC-5 (formerly HDAC-B), HDAC-C, HDAC-D, and HDAC-E. Histone deacetylase activity is thought to modulate the accessibility of transcription factors to enhancer and promoter elements. Indeed, an enrichment of underacetylated histone H4 has  
20        been found in transcriptionally silent regions of the genome (Taunton et al., Science 272: 408-411, 1996).

25        Functional histone deacetylases have been implicated as a requirement in cell cycle progression in both normal and neoplastic cells. Trichostatin A (TCA), an antibiotic isolated from *Streptomyces*, has been shown to inhibit histone deacetylase activity and arrest cell  
30        cycle progression in cells in the G1 and G2 phases (Yoshida et al., J. Biol. Chem. 265: 17174-17179, 1990; Yoshida et al., Exp. Cell Res. 177: 122-131, 1988). Other inhibitors of histone deacetylase activity, including trichostatin C, trapoxin, depudecin, suberoylanilide hydroxamic acid (SAHA), FR901228 (Fujisawa Pharmaceuticals), and butyrate, have been found to similarly inhibit cell cycle progression in cells (Taunton et al., Science 272: 408-411, 1996; Kijima et al., J. Biol. Chem. 268(30):22429-22435, 1993; Kwon et al., Proc. Natl. Acad. Sci. USA 95(7):3356-61, 1998).

The known inhibitors of histone deacetylase are all natural product and are all small molecules that inhibit histone deacetylase activity at the protein level. Moreover, all of the known histone deacetylase inhibitors are non-specific for a particular histone deacetylase enzyme, and more or less inhibit all members of both the histone deacetylase families  
5 equally.

Therefore, there remains a need to develop reagents for inhibiting histone deacetylases at a genetic level, as well as for inhibiting expression of a specific histone deacetylase. There is also a need for the development of methods for using these reagents to identify and inhibit a specific histone deacetylase involved in tumorigenesis.

### **BRIEF SUMMARY OF THE INVENTION**

The invention provides methods and reagents for inhibiting histone deacetylases at a nucleic acid level, as well as for inhibiting expression of a specific histone by inhibiting expression at the nucleic acid level. The invention allows the identification of and specific  
5 inhibition of a specific histone deacetylase involved in tumorigenesis.

Accordingly, in a first aspect, the invention provides an antisense oligonucleotide that inhibits the expression of a histone deacetylase. In certain embodiments of this aspect of the invention, the histone deacetylase is HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, or HDAC-E. In certain other embodiments, the oligonucleotide inhibits  
10 more than one histone deacetylase, or the oligonucleotide inhibits all histone deacetylases. Preferably, the oligonucleotide is a chimeric oligonucleotide or a hybrid oligonucleotide.

In certain preferred embodiments of the first aspect of the invention, the oligonucleotide inhibits transcription of a nucleic acid molecule encoding the histone deacetylase. The nucleic acid molecule may be genomic DNA (*e.g.*, a gene), cDNA, or  
15 RNA. In other embodiments, the oligonucleotide inhibits translation of the histone deacetylase.

In various embodiments of the first aspect of the invention, the antisense oligonucleotide has at least one internucleotide linkage selected from the group consisting of phosphorothioate, phosphorodithioate, alkylphosphonate, alkylphosphonothioate,  
20 phosphotriester, phosphoramidate, siloxane, carbonate, carboxymethylester, acetamidate, carbamate, thioether, bridged phosphoramidate, bridged methylene phosphonate, bridged phosphorothioate and sulfone internucleotide linkages. In certain embodiments, the oligonucleotide comprises a ribonucleotide or 2'-O-substituted ribonucleotide region and a deoxyribonucleotide region.

25 In a second aspect, the invention provides a method for inhibiting a histone deacetylase in a cell comprising contacting the cell with the antisense oligonucleotide of the first aspect of the invention. In certain preferred embodiments of the second aspect of the invention, cell proliferation is inhibited in the contacted cell. In preferred embodiments, the cell is a neoplastic cell which may be in an animal, including a human, and which may be in a  
30 neoplastic growth. In certain preferred embodiments, the method of the second aspect of the invention further comprises contacting the cell with a histone deacetylase protein inhibitor



that interacts with and reduces the enzymatic activity of the histone deacetylase. Preferably, the histone deacetylase protein inhibitor is operably associated with the antisense oligonucleotide.

5 In a third aspect, the invention provides a method for inhibiting neoplastic cell growth in an animal comprising administering to an animal having at least one neoplastic cell present in its body a therapeutically effective amount of the antisense oligonucleotide of the first aspect of the invention with a pharmaceutically acceptable carrier for a therapeutically effective period of time.

10 In certain preferred embodiments of the third aspect of the invention, the method further comprises administering to the animal a therapeutically effective amount of a histone deacetylase protein inhibitor that interacts with and reduces the enzymatic activity of the histone deacetylase with a pharmaceutically acceptable carrier for a therapeutically effective period of time. Preferably, the histone deacetylase protein inhibitor is operably associated with the antisense oligonucleotide.

15 In a fourth aspect, the invention provides a method for identifying a histone deacetylase that is involved in induction of cell proliferation comprising contacting a cell with an antisense oligonucleotide that inhibits the expression of a histone deacetylase, wherein inhibition of cell proliferation in the contacted cell identifies the histone deacetylase as a histone deacetylase that is involved in induction of cell proliferation. In certain preferred  
20 embodiments, the cell is a neoplastic cell, and the induction of cell proliferation is tumorigenesis. In preferred embodiments, the histone deacetylase is HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, or HDAC-E.

In a fifth aspect, the invention provides a method for identifying a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in induction of cell  
25 proliferation comprising contacting a histone deacetylase identified by the method of the fourth aspect of the invention with a candidate compound and measuring the enzymatic activity of the contacted histone deacetylase, wherein a reduction in the enzymatic activity of the contacted histone deacetylase identifies the candidate compound as a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in induction of cell  
30 proliferation. In certain preferred embodiments, the histone deacetylase protein inhibitor interacts with and reduces the enzymatic activity of fewer than all histone deacetylases.

In a sixth aspect, the invention provides a method for identifying a histone deacetylase that is involved in induction of cell differentiation comprising contacting a cell with an antisense oligonucleotide that inhibits the expression of a histone deacetylase, wherein induction of differentiation in the contacted cell identifies the histone deacetylase as a histone deacetylase that is involved in induction of cell differentiation. In certain preferred embodiments, the cell is a neoplastic cell. In preferred embodiments, the histone deacetylase is HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, or HDAC-E.

In a seventh aspect, the invention provides a method for identifying a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in induction of cell differentiation comprising contacting a histone deacetylase identified by the method of the sixth aspect of the invention with a candidate compound and measuring the enzymatic activity of the contacted histone deacetylase, wherein a reduction in the enzymatic activity of the contacted histone deacetylase identifies the candidate compound as a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in induction of cell differentiation. In certain preferred embodiments, the histone deacetylase protein inhibitor interacts with and reduces the enzymatic activity of fewer than all histone deacetylases.

In an eighth aspect, the invention provides a histone deacetylase protein inhibitor identified by the method of the fifth or the seventh aspects of the invention. Preferably, the histone deacetylase protein inhibitor is substantially pure.

In a ninth aspect, the invention provides a method for inhibiting cell proliferation in a cell comprising contacting a cell with at least two of the reagents selected from the group consisting of an antisense oligonucleotide that inhibits a histone deacetylase, a histone deacetylase protein inhibitor, an antisense oligonucleotide that inhibits a DNA methyltransferase, and a DNA methyltransferase protein inhibitor. In one embodiment, the inhibition of cell growth of the contacted cell is greater than the inhibition of cell growth of a cell contacted with only one of the reagents. In certain embodiments, each of the reagents selected from the group is substantially pure. In preferred embodiments, the cell is a neoplastic cell. In yet additional preferred embodiments, the reagents selected from the group are operably associated.

According to the invention, reagents found to specifically inhibit a histone deacetylase involved in neoplasia may be used as therapeutic agents to inhibit neoplastic cell growth in

patients suffering from neoplasia. For example, an antisense oligonucleotide that inhibits the expression of a histone deacetylase may be administered with a pharmaceutically-acceptable carrier (*e.g.*, physiological sterile saline solution) via any route of administration to a patient suffering from neoplasia or hyperplasia in an attempt to alleviate any resulting disease symptom (*e.g.*, death). Likewise, an antisense oligonucleotide that inhibits the expression of a histone deacetylase may be incorporated into a gene therapy expression vector (*e.g.*, a replication-deficient adenoviral vector), and phage particles carrying such vectors may be delivered with a pharmaceutically-acceptable carrier directly to the cells of the neoplastic or hyperplastic growth. Pharmaceutically-acceptable carriers and their formulations are well-known and generally described in, for example, Remington's Pharmaceutical Sciences (18th Edition, ed. A. Gennaro, Mack Publishing Co., Easton, PA, 1990).

### **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a graphic representation of a Northern blotting analysis showing the dose-dependent abilities of representative, nonlimiting, synthetic oligonucleotides according to the invention that specifically bind to either HDAC-1-encoding nucleic acid or both HDAC-1- and HDAC-2-encoding nucleic acids to inhibit expression of HDAC-1 mRNA or both HDAC-1 mRNA and HDAC-2 mRNA, respectively.

Figure 2 is a graphic representation of a Northern blotting analysis showing the dose-dependent abilities of representative, nonlimiting, synthetic oligonucleotides according to the invention that specifically bind to HDAC-2-encoding nucleic acid to inhibit expression of HDAC-2 mRNA.

Figure 3 is a graphic representation of a Western blotting analysis showing the abilities of representative, nonlimiting, synthetic oligonucleotides according to the invention that specifically bind to HDAC-2-encoding nucleic acid to specifically inhibit expression of HDAC-2 protein.

Figure 4 is a graphic representation of a Western blotting analysis showing the abilities of representative, nonlimiting, synthetic oligonucleotides according to the invention that specifically bind to either HDAC-1-encoding nucleic acid or both HDAC-1- and HDAC-2-encoding nucleic acid to inhibit expression of HDAC-1 protein or both HDAC-1 protein and HDAC-2 protein, respectively. Mismatched synthetic oligonucleotides were used as negative controls. Equal loading of all lanes is evidenced by the equivalent expression of actin.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

The invention provides methods and reagents for inhibiting a histone deacetylase at a nucleic acid level, as well as for inhibiting a specific histone deacetylase at the nucleic acid level. The reagents described herein that inhibit histone deacetylase at the nucleic acid level  
5 (i.e., inhibiting transcription and translation) allows the identification of a specific histone deacetylase which is involved in neoplasia. Moreover, therapeutical compositions for treating and/or alleviating the symptoms of neoplasia may be developed using the reagents of the invention that specifically inhibit a particular histone deacetylase involved in neoplasia.

The reagents according to the invention are useful as analytical tools and as  
10 therapeutic tools, including as gene therapy tools. The invention also provides methods and compositions which may be manipulated and fine-tuned to fit the condition(s) to be treated while producing fewer side effects. The patent and scientific literature referred to herein establishes knowledge that is available to those with skill in the art. The issued patents, applications, and references, including GenBank database sequences, that are cited herein are  
15 hereby incorporated by reference to the same extent as if each was specifically and individually indicated to be incorporated by reference.

In a first aspect, the invention provides an antisense oligonucleotide that inhibits the expression of a histone deacetylase. In certain embodiments of this aspect of the invention, the histone deacetylase is HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C,  
20 HDAC-D, or HDAC-E. In certain embodiments, the oligonucleotide inhibits more than one histone deacetylase, or the oligonucleotide inhibits all histone deacetylases.

The antisense oligonucleotides according to the invention are complementary to a region of RNA or double-stranded DNA that encodes a histone deacetylase. For purposes of the invention, the term "oligonucleotide" includes polymers of two or more  
25 deoxyribonucleosides, ribonucleosides, or 2'-O-substituted ribonucleoside residues, or any combination thereof. Preferably, such oligonucleotides have from about 8 to about 50 nucleoside residues, and most preferably from about 12 to about 30 nucleoside residues. The nucleoside residues may be coupled to each other by any of the numerous known internucleoside linkages. Such internucleoside linkages include without limitation  
30 phosphorothioate, phosphorodithioate, alkylphosphonate, alkylphosphonothioate, phosphotriester, phosphoramidate, siloxane, carbonate, carboxymethylester, acetamidate,

carbamate, thioether, bridged phosphoramidate, bridged methylene phosphonate, bridged phosphorothioate, and sulfone internucleotide linkages. In certain preferred embodiments, these internucleoside linkages may be phosphodiester, phosphotriester, phosphorothioate, or phosphoramidate linkages, or combinations thereof. The term oligonucleotide also

5 encompasses such polymers having chemically modified bases or sugars and/or having additional substituents, including without limitation lipophilic groups, intercalating agents, diamines, and adamantane. For purposes of the invention the term "2'-O-substituted" means substitution of the 2' position of the pentose moiety with an -O-lower alkyl group containing 1-6 saturated or unsaturated carbon atoms, or with an -O-aryl or allyl group having 2-6  
10 carbon atoms, wherein such alkyl, aryl, or allyl group may be unsubstituted or may be substituted, *e.g.*, with halo, hydroxy, trifluoromethyl, cyano, nitro, acyl, acyloxy, alkoxy, carboxyl, carbalkoxyl, or amino groups; or such 2' substitution may be with a hydroxy group (to produce a ribonucleoside), an amino or a halo group, but not with a 2'-H group.

For purposes of the invention, the term "complementary" means having the ability to  
15 hybridize to a genomic region, a gene, or an RNA transcript thereof under physiological conditions. Such hybridization is ordinarily the result of base-specific hydrogen bonding between complementary strands, preferably to form Watson-Crick or Hoogsteen base pairs, although other modes of hydrogen bonding, as well as base stacking can lead to hybridization. As a practical matter, such hybridization can be inferred from the observation  
20 of specific gene expression inhibition, which may be at the level of transcription or translation (or both).

Particularly preferred antisense oligonucleotides utilized in this aspect of the invention include chimeric oligonucleotides and hybrid oligonucleotides.

For purposes of the invention, a "chimeric oligonucleotide" refers to an  
25 oligonucleotide having more than one type of internucleoside linkage. One preferred embodiment of such a chimeric oligonucleotide is a chimeric oligonucleotide comprising a phosphorothioate, phosphodiester or phosphorodithioate region, preferably comprising from about 2 to about 12 nucleotides, and an alkylphosphonate or alkylphosphonothioate region (see *e.g.*, Pederson *et al.* U.S. Patent Nos. 5,635,377 and 5,366,878). Preferably, such  
30 chimeric oligonucleotides contain at least three consecutive internucleoside linkages selected from phosphodiester and phosphorothioate linkages, or combinations thereof.

For purposes of the invention, a "hybrid oligonucleotide" refers to an oligonucleotide having more than one type of nucleoside. One preferred embodiment of such a hybrid oligonucleotide comprises a ribonucleotide or 2'-O-substituted ribonucleotide region, preferably comprising from about 2 to about 12 2'-O-substituted nucleotides, and a  
5 deoxyribonucleotide region. Preferably, such a hybrid oligonucleotide will contain at least three consecutive deoxyribonucleosides and will also contain ribonucleosides, 2'-O-substituted ribonucleosides, or combinations thereof (see *e.g.*, Metelev and Agrawal, U.S. Patent No. 5,652,355).

The exact nucleotide sequence and chemical structure of an antisense oligonucleotide  
10 utilized in the invention can be varied, so long as the oligonucleotide retains its ability to inhibit expression of a histone deacetylase. This is readily determined by testing whether the particular antisense oligonucleotide is active by quantitating the amount of mRNA encoding a histone deacetylase, quantitating the amount of histone deacetylase protein, quantitating the histone deacetylase enzymatic activity, or quantitating the ability of histone deacetylase to  
15 inhibit cell growth in a an *in vitro* or *in vivo* cell growth assay, all of which are described in detail in this specification.

Antisense oligonucleotides utilized in the invention may conveniently be synthesized on a suitable solid support using well-known chemical approaches, including H-phosphonate chemistry, phosphoramidite chemistry, or a combination of H-phosphonate chemistry and  
20 phosphoramidite chemistry (*i.e.*, H-phosphonate chemistry for some cycles and phosphoramidite chemistry for other cycles). Suitable solid supports include any of the standard solid supports used for solid phase oligonucleotide synthesis, such as controlled-pore glass (CPG) (see, *e.g.*, Pon, R. T., Methods in Molec. Biol. 20: 465-496, 1993).

Antisense oligonucleotides according to the invention are useful for a variety of  
25 purposes. For example, they can be used as "probes" of the physiological function of histone deacetylase by being used to inhibit the activity of histone deacetylase in an experimental cell culture or animal system and to evaluate the effect of inhibiting such histone deacetylase activity. This is accomplished by administering to a cell or an animal an antisense oligonucleotide that inhibits histone deacetylase expression according to the invention and  
30 observing any phenotypic effects. In this use, the antisense oligonucleotides according to the invention is preferable to traditional "gene knockout" approaches because it is easier to use,

and can be used to inhibit histone deacetylase activity at selected stages of development or differentiation. Thus, the method according to the invention can serve as a probe to test the role of histone deacetylation in various stages of development.

Preferred antisense oligonucleotides of the invention inhibit either the transcription of  
5 a nucleic acid molecule encoding the histone deacetylase, or the translation of a nucleic acid molecule encoding the histone deacetylase. Histone deacetylase-encoding nucleic acids may be RNA or double stranded DNA regions and include, without limitation, intronic sequences, untranslated 5' and 3' regions, intron-exon boundaries as well as coding sequences from a histone deacetylase family member gene. For human sequences, see *e.g.*, Yang et al., Proc.  
10 Natl. Acad. Sci. USA 93(23): 12845-12850, 1996; Furukawa et al., Cytogenet. Cell Genet. 73(1-2): 130-133, 1996; Yang et al., J. Biol. Chem. 272(44): 28001-28007, 1997; Betz et al., Genomics 52(2): 245-246, 1998; Taunton et al., Science 272(5260): 408-411, 1996; and Dangond et al., Biochem. Biophys. Res. Commun. 242(3): 648-652, 1998).

Particularly preferred non-limiting examples of antisense oligonucleotides of the  
15 invention are complementary to regions of RNA or double-stranded DNA encoding a histone deacetylase (*e.g.*, HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, or HDAC-E). The antisense oligonucleotides according to the invention are complementary to regions of RNA or double-stranded DNA that encode HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, and/or HDAC-E. The sequence of human HDAC-1 can be  
20 found in GenBank Accession No. U50079 (amino acid sequence in SEQ ID NO:24; nucleic acid sequence in SEQ ID NO:25). The sequence of human HDAC-2 can be found in GenBank Accession No. U31814 (amino acid sequence in SEQ ID NO: 26; nucleic acid sequence in SEQ ID NO: 27). The sequence of human HDAC-3 can be found in GenBank Accession No. U75697 (amino acid sequence in SEQ ID NO: 28; nucleic acid sequence in  
25 SEQ ID NO: 29). The sequence of human HDAC-4 (formerly human HDAC-A) in GenBank Accession No. AB006626 (amino acid sequence in SEQ ID NO: 30; nucleic acid sequence in SEQ ID NO: 31). The sequence of human HDAC-5 (formerly human HDAC-B) can be found in GenBank Accession No. AB011172 (amino acid sequence in SEQ ID NO: 32; nucleic acid sequence in SEQ ID NO: 33). The sequence of human HDAC-C can be found in  
30 GenBank Accession No. AC004994 (amino acid sequence in SEQ ID NO: 34; nucleic acid



sequence in SEQ ID NO: 35). The sequence of human HDAC-D can be found in GenBank Accession No. AC004466 (nucleic acid sequence in SEQ ID NO: 36).

The sequences encoding histone deacetylases from many non-human animal species are also known (see, for example, GenBank Accession Numbers AF006603, AF006602, and  
 5 AF074882 for murine histone deacetylases). Accordingly, the antisense oligonucleotides of the invention may also be complementary to regions of RNA or double-stranded DNA that encode histone deacetylases from non-human animals. Particularly, preferred oligonucleotides have nucleotide sequences of from about 13 to about 35 nucleotides which include the nucleotide sequences shown below as SEQ ID NOs: 1-18. Yet additional  
 10 particularly preferred oligonucleotides have nucleotide sequences of from about 15 to about 26 nucleotides of the nucleotide sequences shown below. Most preferably, the oligonucleotides shown below have phosphorothioate backbones, are 20-26 nucleotides in length, and are modified such that the terminal four nucleotides at the 5' end of the oligonucleotide and the terminal four nucleotides at the 3' end of the oligonucleotide each  
 15 have 2' -O- methyl groups attached to their sugar residues.

Antisense oligonucleotide specific for human HDAC-1 (MG2608):

5'-GAA ACG TGA GGG ACT CAG CA-3' (SEQ ID NO: 1).

Antisense oligonucleotide specific for both human HDAC-1 and human HDAC-2 (MG2610) is a 25/25/25/25 mixture of four oligonucleotides:

- 20 5'- CAG CAA ATT ATG GGT CAT GCG GAT TC-3' (SEQ ID NO: 2);  
 5'- CAG CAA GTT ATG AGT CAT GCG GAT TC-3' (SEQ ID NO: 3);  
 5'- CAG CAA ATT ATG AGT CAT GCG GAT TC-3' (SEQ ID NO: 4); and  
 5'- CAG CAA GTT ATG GGT CAT GCG GAT TC-3' (SEQ ID NO: 5).

Antisense oligonucleotide specific for human HDAC-2:

- 25 5'-TGC TGC TGC TGC TGC TGC CG-3' (MG2628; SEQ ID NO: 6);  
 5'-CCT CCT GCT GCT GCT GCT GC-3' (MG2633; SEQ ID NO: 7);  
 5'-GGT TCC TTT GGT ATC TGT TT-3' (MG2635; SEQ ID NO: 8); and  
 5'-CTC CTT GAC TGT ACG CCA TG-3' (MG2636; SEQ ID NO: 9).

30 The antisense oligonucleotides according to the invention may optionally be formulated with any of the well known pharmaceutically acceptable carriers or diluents (see

preparation of pharmaceutically acceptable formulations in, *e.g.*, Remington's Pharmaceutical Sciences, 18th Edition, ed. A. Gennaro, Mack Publishing Co., Easton, PA, 1990).

In a second aspect, the invention provides a method for inhibiting a histone deacetylase in a cell comprising contacting the cell with the antisense oligonucleotide that inhibits the expression of a histone deacetylase. Preferably, cell proliferation is inhibited in the contacted cell. Thus, the antisense oligonucleotides according to the invention are useful in therapeutic approaches to human diseases including benign and malignant neoplasms by inhibiting cell proliferation in cells contacted with the antisense oligonucleotides. The phrase "inhibiting cell proliferation" is used to denote an ability of a histone deacetylase antisense oligonucleotide or a histone deacetylase protein inhibitor (or combination thereof) to retard the growth of cells contacted with the oligonucleotide or protein inhibitor, as compared to cells not contacted. Such an assessment of cell proliferation can be made by counting contacted and non-contacted cells using a Coulter Cell Counter (Coulter, Miami, FL) or a hemacytometer. Where the cells are in a solid growth (*e.g.*, a solid tumor or organ), such an assessment of cell proliferation can be made by measuring the growth with calipers, and comparing the size of the growth of contacted cells with non-contacted cells. Preferably, the term includes a retardation of cell proliferation that is at least 50% of non-contacted cells. More preferably, the term includes a retardation of cell proliferation that is 100% of non-contacted cells (*i.e.*, the contacted cells do not increase in number or size). Most preferably, the term includes a reduction in the number or size of contacted cells, as compared to non-contacted cells. Thus, a histone deacetylase antisense oligonucleotide or a histone deacetylase protein inhibitor that inhibits cell proliferation in a contacted cell may induce the contacted cell to undergo growth retardation, to undergo growth arrest, to undergo programmed cell death (*i.e.*, to apoptose), or to undergo necrotic cell death.

Conversely, the phrase "inducing cell proliferation" is used to denote the requirement of the presence or enzymatic activity of a histone deacetylase for cell proliferation in a normal (*i.e.*, non-neoplastic) cell. Hence, over-expression of a histone deacetylase that induces cell proliferation may or may not lead to increased cell proliferation; however, inhibition of a histone deacetylase that induces cell proliferation will lead to inhibition of cell proliferation.

The phrase "inducing cell differentiation" is used to denote the ability of a histone deacetylase antisense oligonucleotide or histone deacetylase protein inhibitor (or combination thereof) to induce differentiation in a contacted cell as compared to a cell that is not contacted. Thus, a neoplastic cell, when contacted with a histone deacetylase antisense oligonucleotide or histone deacetylase protein inhibitor (or both) of the invention, may be induced to differentiate, resulting in the production of a daughter cell that is phylogenetically more advanced than the contacted cell.

The cell proliferation inhibiting ability of the antisense oligonucleotides according to the invention allows the synchronization of a population of a-synchronously growing cells. For example, the antisense oligonucleotides of the invention may be used to arrest a population of non-neoplastic cells grown *in vitro* in the G1 or G2 phase of the cell cycle. Such synchronization allows, for example, the identification of gene and/or gene products expressed during the G1 or G2 phase of the cell cycle. Such a synchronization of cultured cells may also be useful for testing the efficacy of a new transfection protocol, where transfection efficiency varies and is dependent upon the particular cell cycle phase of the cell to be transfected. Use of the antisense oligonucleotides of the invention allows the synchronization of a population of cells, thereby aiding detection of enhanced transfection efficiency.

The anti-neoplastic utility of the antisense oligonucleotides according to the invention is described in detail elsewhere in this specification.

In yet other preferred embodiments, the cell contacted with a histone deacetylase antisense oligonucleotide is also contacted with a histone deacetylase protein inhibitor.

As used herein, the term "histone deacetylase protein inhibitor" denotes an active moiety capable of interacting with a histone deacetylase at the protein level and reducing the activity of that histone deacetylase. Histone deacetylase protein inhibitors include, without limitation, trichostatin A, trichostatin B, trichostatin C, depudecin, trapoxin, butyrate, suberoylanilide hydroxamic acid (SAHA), FR901228 (Fujisawa Pharmaceuticals), and acetyldinaline (el-Beltagi et al., Cancer Res. 53(13):3008-3014, 1993). A histone deacetylase protein inhibitor is a molecule that reduces the activity of a histone deacetylase to a greater extent than it reduces the activity of any unrelated protein. In a preferred embodiment, such reduction of the activity of a histone deacetylase is at least 5-fold, more preferably at least

10-fold, most preferably at least 50-fold. In another embodiment, the activity of a histone deacetylase is reduced 100-fold. Preferably, a histone deacetylase protein inhibitor interacts with and reduces the activity of fewer than all histone deacetylases. By "all histone deacetylases" is meant all of the members of both of the histone deacetylase families of proteins from a particular species of animal and includes, without limitation, HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, or HDAC-E, all of which are considered "related proteins," as used herein. For example, a preferred histone deacetylase protein inhibitor interacts with and inhibits HDAC-1 and HDAC-2, but does not interact with and inhibit HDAC-3. Most preferably, a histone deacetylase protein inhibitor interacts with and reduces the activity of one histone deacetylase (*e.g.*, HDAC-2), but does not interact with or reduce the activities of the other histone deacetylases (*e.g.*, HDAC-1 and HDAC-3). As discussed below, a preferred histone deacetylase protein inhibitor is one that interacts with and reduces the enzymatic activity of a histone deacetylase that is involved in tumorigenesis.

Preferably, the histone deacetylase protein inhibitor is operably associated with the antisense oligonucleotide. As mentioned above, the antisense oligonucleotides according to the invention may optionally be formulated well known pharmaceutically acceptable carriers or diluents. This formulation may further contain one or more one or more additional histone deacetylase antisense oligonucleotide(s), and/or one or more histone deacetylase protein inhibitor(s), or it may contain any other pharmacologically active agent.

In a particularly preferred embodiment of the invention, the antisense oligonucleotide is in operable association with a histone deacetylase protein inhibitor. The term "operable association" includes any association between the antisense oligonucleotide and the histone deacetylase protein inhibitor which allows an antisense oligonucleotide to inhibit histone deacetylase-encoding nucleic acid expression and allows the histone deacetylase protein inhibitor to inhibit histone deacetylase enzymic activity. One or more antisense oligonucleotide of the invention may be operably associated with one or more histone deacetylase protein inhibitor. Preferably, an antisense oligonucleotide of the invention that targets one particular histone deacetylase (*e.g.*, HDAC-2) is operably associated with a histone deacetylase protein inhibitor which targets the same histone deacetylase. A preferred operable association is a hydrolyzable. Preferably, the hydrolyzable association is a covalent linkage between the antisense oligonucleotide and the histone deacetylase protein inhibitor.

Preferably, such covalent linkage is hydrolyzable by esterases and/or amidases. Examples of such hydrolyzable associations are well known in the art. Phosphate esters are particularly preferred.

In certain preferred embodiments, the covalent linkage may be directly between the  
5 antisense oligonucleotide and the histone deacetylase protein inhibitor so as to integrate the histone deacetylase protein inhibitor into the backbone. Alternatively, the covalent linkage may be through an extended structure and may be formed by covalently linking the antisense oligonucleotide to the histone deacetylase protein inhibitor through coupling of both the  
10 antisense oligonucleotide and the histone deacetylase protein inhibitor to a carrier molecule such as a carbohydrate, a peptide or a lipid or a glycolipid. Other preferred operable associations include lipophilic association, such as formation of a liposome containing an antisense oligonucleotide and the histone deacetylase protein inhibitor covalently linked to a lipophilic molecule and thus associated with the liposome. Such lipophilic molecules include without limitation phosphatidylcholine, cholesterol, phosphatidylethanolamine, and synthetic  
15 neoglycolipids, such as syallylacNAc-HDPE. In certain preferred embodiments, the operable association may not be a physical association, but simply a simultaneous existence in the body, for example, when the antisense oligonucleotide is associated with one liposome and the protein effector is associated with another liposome.

In a third aspect, the invention provides a method for inhibiting neoplastic cell  
20 proliferation in an animal comprising administering to an animal having at least one neoplastic cell present in its body a therapeutically effective amount of the antisense oligonucleotide of the first aspect of the invention with a pharmaceutically acceptable carrier for a therapeutically effective period of time. Preferably, the animal is a mammal, particularly a domesticated mammal. Most preferably, the animal is a human.

25 The term "neoplastic cell" is used to denote a cell that shows aberrant cell growth. Preferably, the aberrant cell growth of a neoplastic cell is increased cell growth. A neoplastic cell may be a hyperplastic cell, a cell that shows a lack of contact inhibition of growth *in vitro*, a benign tumor cell that is incapable of metastasis *in vivo*, or a cancer cell that is capable of metastases *in vivo* and that may recur after attempted removal. The term  
30 "tumorigenesis" is used to denote the induction of cell proliferation that leads to the development of a neoplastic growth.

The terms "therapeutically effective amount" and "therapeutically effective period of time" are used to denote known treatments at dosages and for periods of time effective to reduce neoplastic cell growth. Preferably, such administration should be parenteral, oral, sublingual, transdermal, topical, intranasal, or intrarectal. When administered systemically  
5 the therapeutic composition is preferably administered at a sufficient dosage to attain a blood level of antisense oligonucleotide from about 0.1  $\mu\text{M}$  to about 10  $\mu\text{M}$ . For localized administration, much lower concentrations than this may be effective, and much higher concentrations may be tolerated. One of skill in the art will appreciate that such therapeutic effect resulting in a lower effective concentration of the histone deacetylase inhibitor may  
10 vary considerably depending on the tissue, organ, or the particular animal or patient to be treated according to the invention.

In a preferred embodiment, the therapeutic composition of the invention is administered systemically at a sufficient dosage to attain a blood level of antisense oligonucleotide from about 0.01  $\mu\text{M}$  to about 20  $\mu\text{M}$ . In a particularly preferred embodiment,  
15 the therapeutic composition is administered at a sufficient dosage to attain a blood level of antisense oligonucleotide from about 0.05  $\mu\text{M}$  to about 15  $\mu\text{M}$ . In a more preferred embodiment, the blood level of antisense oligonucleotide is from about 0.1  $\mu\text{M}$  to about 10  $\mu\text{M}$ .

For localized administration, much lower concentrations than this may be  
20 therapeutically effective. Preferably, a total dosage of antisense oligonucleotide will range from about 0.1 mg to about 200 mg oligonucleotide per kg body weight per day. In a more preferred embodiment, a total dosage of antisense oligonucleotide will range from about 1 mg to about 20 mg oligonucleotide per kg body weight per day. In a most preferred embodiment, a total dosage of antisense oligonucleotide will range from about 2 mg to about 10 mg  
25 oligonucleotide per kg body weight per day. In a particularly preferred embodiment, the therapeutically effective amount of a histone deacetylase antisense oligonucleotide is about 0.5 mg oligonucleotide per kg body weight per day.

In certain preferred embodiments of the third aspect of the invention, the method further comprises administering to the animal a therapeutically effective amount of a histone  
30 deacetylase protein inhibitor with a pharmaceutically acceptable carrier for a therapeutically effective period of time. Preferably, the histone deacetylase protein inhibitor is operably

associated with the antisense oligonucleotide. Methods for the operable association of a histone deacetylase protein inhibitor with a histone deacetylase antisense oligonucleotide are described above.

The histone deacetylase protein inhibitor-containing therapeutic composition of the invention is administered systemically at a sufficient dosage to attain a blood level histone deacetylase protein inhibitor from about 0.01 $\mu$ M to about 10 $\mu$ M. In a particularly preferred embodiment, the therapeutic composition is administered at a sufficient dosage to attain a blood level of histone deacetylase protein inhibitor from about 0.05 $\mu$ M to about 10 $\mu$ M. In a more preferred embodiment, the blood level of histone deacetylase protein inhibitor is from about 0.1 $\mu$ M to about 7 $\mu$ M. For localized administration, much lower concentrations than this may be effective. Preferably, a total dosage of histone deacetylase protein inhibitor will range from about 0.01 mg to about 5 mg protein effector per kg body weight per day. In a more preferred embodiment, a total dosage of histone deacetylase protein inhibitor will range from about 0.1 mg to about 4 mg protein effector per kg body weight per day. In a most preferred embodiment, a total dosage of histone deacetylase protein inhibitor will range from about 0.1 mg to about 1 mg protein effector per kg body weight per day. In a particularly preferred embodiment, the therapeutically effective synergistic amount of histone deacetylase protein inhibitor (when administered with an antisense oligonucleotide) is 0.1 mg per kg body weight per day.

This aspect of the invention results in an improved inhibitory effect, thereby reducing the therapeutically effective concentrations of either or both of the nucleic acid level inhibitor (*i.e.*, antisense oligonucleotide) and the protein level inhibitor (*i.e.*, histone deacetylase protein inhibitor) required to obtain a given inhibitory effect as compared to those necessary when either is used individually.

Furthermore, one of skill will appreciate that the therapeutically effective synergistic amount of either the antisense oligonucleotide or the histone deacetylase inhibitor may be lowered or increased by fine tuning and altering the amount of the other component. The invention therefore provides a method to tailor the administration/treatment to the particular exigencies specific to a given animal species or particular patient. Therapeutically effective ranges may be easily determined for example empirically by starting at relatively low amounts and by step-wise increments with concurrent evaluation of inhibition.

In a fourth aspect, the invention provides a method for investigating the role of a particular histone deacetylase in cellular proliferation, including the proliferation of neoplastic cells. In this method, the cell type of interest is contacted with an amount of an antisense oligonucleotide that inhibits the expression of a histone deacetylase, as described  
5 for the first aspect according to the invention, resulting in inhibition of expression of the histone deacetylase in the cell. If the contacted cell with inhibited expression of the histone deacetylase also shows an inhibition in cell proliferation, then the histone deacetylase is involved in the induction of cell proliferation. In this scenario, if the contacted cell is a neoplastic cell, and the contacted neoplastic cell shows an inhibition of cell proliferation, then  
10 the histone deacetylase whose expression was inhibited is a histone deacetylase that is involved in tumorigenesis. Preferably, the histone deacetylase is HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, or HDAC-E.

Thus, by identifying a particular histone deacetylase that is involved in the induction of cell proliferation, only that particular histone deacetylase need be targeted with an  
15 antisense oligonucleotide to inhibit cell proliferation or induce differentiation. Consequently, a lower therapeutically effective dose of antisense oligonucleotide may be able to effectively inhibit cell proliferation. Moreover, undesirable side effects of inhibiting all histone deacetylases may be avoided by specifically inhibiting the one (or more) histone deacetylase(s) involved in inducing cell proliferation.

20 Once such a histone deacetylase involved in inducing cell proliferation is identified using the antisense oligonucleotides of the first aspect of the invention, then histone deacetylase protein inhibitors may be generated that specifically inhibit the histone deacetylase involved in inducing cell proliferation, while not inhibiting other histone deacetylases not involved in inducing cell proliferation. Accordingly, in a fifth aspect, the  
25 invention provides a method for identifying a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in the induction of cell proliferation. This method comprises contacting a histone deacetylase identified as being involved in inducing cell proliferation with a candidate compound and measuring the enzymatic activity of the contacted histone deacetylase. A reduction in the enzymatic activity of the contacted histone  
30 deacetylase identifies the candidate compound as a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in induction of cell proliferation.



Measurement of the enzymatic activity of a histone deacetylase can be achieved using known methodologies. For example, Yoshida et al. (J. Biol. Chem. 265: 17174-17179, 1990) describe the assessment of histone deacetylase enzymatic activity by the detection of acetylated histones in trichostatin A treated cells. Taunton et al. (Science 272: 408-411, 5 1996) similarly describes methods to measure histone deacetylase enzymatic activity using endogenous and recombinant HDAC-1. Both Yoshida et al. (J. Biol. Chem. 265: 17174-17179, 1990) and Taunton et al. (Science 272: 408-411, 1996) are hereby incorporated by reference.

Preferably, the histone deacetylase protein inhibitor that inhibits a histone deacetylase 10 that is involved in induction of cell proliferation is a histone deacetylase protein inhibitor that interacts with and reduces the enzymatic activity of fewer than all histone deacetylases.

In a sixth aspect, the invention provides a method for identifying a histone deacetylase that is involved in induction of cell differentiation comprising contacting a cell with an antisense oligonucleotide that inhibits the expression of a histone deacetylase, wherein 15 induction of differentiation in the contacted cell identifies the histone deacetylase as a histone deacetylase that is involved in induction of cell differentiation. Preferably, the cell is a neoplastic cell. In preferred embodiments, the histone deacetylase is HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, or HDAC-E.

In a seventh aspect, the invention provides a method for identifying a histone 20 deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in induction of cell differentiation comprising contacting a histone deacetylase identified by the method of the sixth aspect of the invention with a candidate compound and measuring the enzymatic activity of the contacted histone deacetylase, wherein a reduction in the enzymatic activity of the contacted histone deacetylase identifies the candidate compound as a histone deacetylase 25 protein inhibitor that inhibits a histone deacetylase that is involved in induction of cell differentiation. In certain preferred embodiments, the histone deacetylase protein inhibitor interacts with and reduces the enzymatic activity of fewer than all histone deacetylases.

In an eighth aspect, the invention provides a histone deacetylase protein inhibitor identified by the method of the fifth or the seventh aspects of the invention. Preferably, the 30 histone deacetylase protein inhibitor is substantially pure.

Substantially purified proteins can be achieved by any standard method including, without limitation, expression of recombinant protein, affinity chromatography, antibody-based affinity purification, and high performance liquid chromatography (HPLC; see, e.g., Fisher (1980) Laboratory Techniques in Biochemistry and Molecular Biology, Work and Burdon (eds.), Elsevier). Preferably, a substantially purified protein is at least 80%, by weight, pure in that it is free from other proteins or naturally-occurring organic molecules. More preferably, a substantially purified protein is at least 90% pure, by weight. Most preferably, a substantially purified protein is at least 95% pure, by weight.

In a ninth aspect, the invention provides a method for inhibiting cell proliferation in a cell comprising contacting a cell with at least two of the reagents selected from the group consisting of an antisense oligonucleotide that inhibits a histone deacetylase, a histone deacetylase protein inhibitor, an antisense oligonucleotide that inhibits a DNA methyltransferase, and a DNA methyltransferase protein inhibitor. In one embodiment, the inhibition of cell growth of the contacted cell is greater than the inhibition of cell growth of a cell contacted with only one of the reagents. In certain preferred embodiments, each of the reagents selected from the group is substantially pure. In preferred embodiments, the cell is a neoplastic cell. In yet additional preferred embodiments, the reagents selected from the group are operably associated.

Antisense oligonucleotides that inhibit DNA methyltransferase are described in Szyf and von Hofe, U.S. Patent No. 5,578,716, the entire contents of which are incorporated by reference. DNA methyltransferase protein inhibitors include, without limitation, 5-aza-2'-deoxycytidine (5-aza-dC), 5-fluoro-2'-deoxycytidine, 5-aza-cytidine (5-aza-C), or 5,6-dihydro-5-aza-cytidine.

The following examples are intended to further illustrate certain preferred embodiments of the invention and are not limiting in nature. Those skilled in the art will recognize, or be able to ascertain, using no more than routine experimentation, numerous equivalents to the specific substances and procedures described herein. Such equivalents are considered to be within the scope of this invention, and are covered by the appended claims.

30

### Example 1

#### Screening of Antisense Oligonucleotides

To identify which antisense oligonucleotides were most effective at inhibiting a specific histone deacetylase, a number of oligonucleotides were generated based on the sequences provided in GenBank Accession Number U50079 for HDAC-1 and GenBank Accession Number U31814 for HDAC-2. Some of the oligonucleotides screened were described in Table 2 and Table 3 of Besterman et al., U.S. patent application serial no. 60/104,804, filed October 19, 1998, the entire disclosure of which is hereby incorporated by reference.

10 In addition, oligonucleotides were generated which were complementary to both HDAC-1 and HDAC-2.

To screen these oligonucleotides for an ability to inhibit the targeted histone deacetylase, a Northern blotting analysis was first performed. To do this, T24 human bladder carcinoma cells (commercially available from the American Type Culture Collection (ATCC), Manassas, VA) were grown under suggested conditions. Before addition of oligonucleotides, cells were washed with PBS (phosphate buffered saline). Next, lipofectin transfection reagent (Gibco-BRL Mississauga, Ontario), at a concentration of 6.25 µg/ml, was added to serum free OPTIMEM medium (GIBCO/BRL), which was then added to the cells. Oligonucleotides to be screened were then added to different wells of cells (*i.e.*, one oligonucleotide per well of cells). The same concentration of oligonucleotide (*e.g.*, 50 nM) was used per well of cells. The cells were allowed to incubate with lipofectin and oligonucleotide for 4 hours at 37°C in a cell culture incubator. The cells were then washed with PBS and returned to full serum-containing medium. Twenty-four hours later, the cells were harvested for determination of HDAC mRNA levels by Northern blotting analysis.

25 For determination of mRNA levels by Northern blot, total RNA was prepared from cells by the guanidinium isothiocyanate standard procedure (see, *e.g.*, Ausubel et al., Current Protocols in Molecular Biology, John Wiley & Sons, New York, NY, 1994), with the exception of an additional precipitation step in 2 M LiCl overnight at 4°C to purify RNA from cellular DNA contamination. Northern blotting analysis was performed according to standard protocols. Probes for HDAC-1 and HDAC-2 were full length cDNA clones generated by PCR amplification from the known sequences for each (*e.g.*, GenBank

Accession Nos. U50079 and U31814, respectively). These probes were radiolabelled with  $^{32}$ P-ATP. Northern blots were scanned and quantified using Alpha Imager (Alpha Innovotech).

The oligonucleotides which showed an ability to reduce the mRNA expression of a targeted histone deacetylase (*i.e.*, were able to inhibit transcription of the histone deacetylase mRNA) were next screened for an ability to inhibit expression of the targeted histone deacetylase protein. To do this, T24 cells were transfected with oligonucleotide using lipofectin as described above. Twenty-four hours later, the cells were lysed according to standard procedures. The whole cell extracts (50  $\mu$ g) were resolved on 7-15% gradient SDS/PAGE, transferred to PVDF membrane (Amersham, Arlington Heights, IL), and subjected to Western blotting analysis with rabbit polyclonal HDAC1- and HDAC-2 specific antibodies (1:500, Santa Cruz Biotech., Santa Cruz, CA) were used. Detection was accomplished with a secondary anti- rabbit IgG-HR peroxidase antibody and an enhanced chemiluminescence detection kit (Amersham) accordingly to manufacturer's instructions.

Based on our results, the following antisense oligonucleotides were identified as being most effective at inhibiting the expression of targeted histone deacetylase as determined by both mRNA and protein expression blotting analysis. These oligonucleotides are as follows:

For inhibition of HDAC-1, Oligonucleotide No. MG2608 having the sequence:

5'-GAA ACG TGA GGG ACT CAG CA-3' (SEQ ID NO: 10).

For inhibition of both HDAC-1 and HDAC-2, Oligonucleotide No. MG2610 is a 25/25/25/25 mixture of four oligonucleotides having the sequences:

5'- CAG CAA ATT ATG GGT CAT GCG GAU UC-3' (SEQ ID NO: 11);

5'- CAG CAA GTT ATG AGT CAT GCG GAU UC-3' (SEQ ID NO: 12);

5'- CAG CAA ATT ATG AGT CAT GCG GAU UC-3' (SEQ ID NO: 13);

5'- CAG CAA GTT ATG GGT CAT GCG GAU UC-3' (SEQ ID NO: 14).

For inhibition of HDAC-2, Table I shows the antisense oligonucleotides found to be most effective:

Table I

Oligonucleotide No.	Sequence	SEQ ID NO	Target
MG2628	5'- <u>UGC</u> UGC TGC TGC TGC T <u>GC CG</u> -3'	15	121-141
MG2633	5'- <u>CCU</u> CCT GCT GCT GCT G <u>CU GC</u> -3'	16	132-152
MG2635	5'- <u>GGU</u> UCC TTT GGT ATC T <u>GU UU</u> -3'	17	1605-1625
MG2636	5'- <u>CUC</u> CTT GAC TGT ACG C <u>CA UG</u> -3'	18	1-20

(\*\*\*) target reference numbering is in accordance with HDAC-2, GenBank Accession Number

U31814.

- 5 To evaluate the specificity of the second generation histone deacetylase antisense oligonucleotides, mismatch control oligonucleotides of HDAC-1 (MG2608) and HDAC-1 / 2 (MG2610) were generated. These mismatch control oligonucleotides were generated by substituting bases, primarily in the four 5' and 3' nucleotides, where the highest affinity with the targeted histone deacetylase-encoding nucleic acid occurs.
- 10 HDAC-1 MISMATCH CONTROL (MG2609), has the sequence:  
5'-CAA UCG TCA GAG ACT CCG AA-3' (SEQ ID NO: 19).

HDAC-1 / 2 MISMATCH CONTROL (MG2637), has a 225/25/25/25 mixture of four oligonucleotides having the sequences:

- 5'-AAG GAA GTC ATG AAT GAT GCC CAU UG-3' (SEQ ID NO: 20);
- 15 5'-AAG GAA ATC ATG GAT GAT GCC CAU UG-3' (SEQ ID NO: 21);
- 5'-AAG GAA GTC ATG GAT GAT GCC CAU UG-3' (SEQ ID NO: 22);
- 5'-AAG GAA ATC ATG AAT GAT GCC CAU UG-3' (SEQ ID NO: 23).

- These oligonucleotides (*i.e.*, having SEQ ID NOs: 10-23) were second generation oligonucleotides (*i.e.*, 4x4 hybrids). That is, oligonucleotides having SEQ ID NOs: 10-23
- 20 were chemically modified as follows: A equals 2'-deoxyriboadenosine; C equals 2'-deoxyribocytidine; G equals 2'-deoxyriboguanosine; T equals 2'-deoxyribothymidine; A equals riboadenosine; U equals uridine; C equals ribocytidine; and G equals riboguanosine. The underlined bases were 2'-methoxyribose substituted nucleotides. Non-underlined bases indicate deoxyribose nucleosides. The backbone of each oligonucleotide consisted of a
- 25 phosphorothioate linkage between adjoining nucleotides.

A number of oligonucleotides are next generated which are complementary to HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, and HDAC-E. These oligonucleotides are based on the known nucleic acid sequences of these histone deacetylases (see, *e.g.*, GenBank Accession No. U75697 for HDAC-3). Antisense oligonucleotides specific for one of these histone deacetylases are screened for efficacy at inhibiting expression of mRNA and protein as described above for HDAC-1, HDAC-1 / 2, and HDAC-2. In addition, antisense oligonucleotides that inhibit more than one histone deacetylase (*e.g.*, HDAC-1 / 3 / C-specific) are also generated by mixing antisense oligonucleotides specific for each histone deacetylase and screened for efficacy.

10

### Example 2

#### Inhibition of Histone Deacetylase mRNA Expression With Antisense Oligonucleotides

To determine the specificity and dose requirements of the antisense oligonucleotides specific for histone deacetylase-encoding nucleic acid, the dose dependent inhibition of these oligonucleotides on histone deacetylase mRNA expression was examined.

To do this, T24 cells were transfected using lipofectin (as described in Example 1) using 10, 25, 50, or 100 nM oligonucleotide. The cells were harvested twenty-four hours following transfection, RNA prepared, and Northern blotting analysis performed as described in Example 1 using radiolabelled HDAC-1 and HDAC-2 cDNA as probe.

Fig. 1 shows the dose dependent inhibition of HDAC-1 mRNA expression by both HDAC-1 and HDAC-1 / 2 antisense oligonucleotides at 50-100 nM. Conversely, HDAC-2 mRNA expression was inhibited by only the HDAC-1 / 2 antisense oligonucleotide (MG2610) at 50-100 nM, while the HDAC-1 antisense oligonucleotide (MG2608) had no effect. The oligonucleotides used in the experiment, the results of which are shown in Fig. 1, were first generation oligonucleotides (*i.e.*, were not chemically modified). The oligonucleotides used to obtain the results shown in Fig. 1 had sequences of SEQ ID NOs: 1-5.

Fig. 2 shows the dose-dependent inhibition of HDAC-2 mRNA by HDAC-2 antisense oligonucleotide. All four HDAC-2 antisense oligonucleotide (MG2628, MG2633, MG2635, and MG2636) were able to reduce the level of HDAC-2 mRNA expression at 50-100 nM.

30

MG2628 appeared particularly efficacious at reducing HDAC-2 mRNA expression in this experiment.

These data demonstrated that by targeting histone deacetylase at the nucleic acid level with antisense oligonucleotide, a reduction in mRNA expression could be achieved 24 hours following exposure to the oligonucleotide.

### Example 3

#### Inhibition of Histone Deacetylase Protein Expression With Second Generation Antisense Oligonucleotides

To determine the ability of histone deacetylase antisense oligonucleotides to inhibit protein expression, second generation versions of the HDAC-1, HDAC-1 / 2, and HDAC-2 antisense oligonucleotides were generated. Each of these second generation antisense oligonucleotides had a backbone consisting of a phosphorothioate linkage between each adjoining nucleotide. Moreover, the four terminal nucleotide residues at both the 5' and 3' ends of the oligonucleotide had sugar residues comprising a 2'-O-methyl group. This modification to the terminal nucleotide residues served to increase binding affinity of the oligonucleotide to the targeted nucleic acid, and to increase the stability of the oligonucleotide by inhibiting nuclease susceptibility.

Fig. 3 shows the ability of second generation HDAC-2 antisense oligonucleotides to inhibit HDAC-2 protein expression. T24 cells were transfected with 0, 25, or 50 nM MG2628 or MG2636 using lipofectin, as described in Example 1. Twenty-four hours later, the cells were transfected a second time with the same amount of the same oligonucleotide. Twenty-four hours after this (*i.e.*, 48 hours after the first transfection), cellular proteins were prepared, resolved on 7-15% gradient SDS-PAGE, and subjected to Western blotting analysis as described in Example 1 with rabbit polyclonal HDAC2 specific antibody (1:500, Santa Cruz Biotech). Following blotting with the secondary anti-rabbit IgG-HR peroxidase antibody and visualization with the enhanced chemiluminescence detection kit (Amersham), the blot was stripped and re-probed with an antibody specific to actin to verify equal loading of all wells (data not shown).

As can be seen in Fig. 3, 50  $\mu$ M of second generation MG2628 or MG2836 was able to inhibit HDAC-2 protein expression.

Fig. 4 shows the specific ability of the HDAC-1 / 2 and HDAC-1 antisense oligonucleotides to inhibit protein expression of both HDAC-1 and HDAC-2 or HDAC-1, respectively, when compared to the mismatch controls. T24 cells were transfected twice as described above with 50 nM oligonucleotide. Cell lysates were prepared twenty-four hours following the second transfection, resolved on 7-15% gradient SDS-PAGE, and transferred to PVDF membrane. The PVDF membrane blot was first blotted with anti-HDAC-1 antibody. Following detection with horseradish peroxidase-labelled secondary antibody and enhanced chemiluminescence, the blot was stripped, and re-probed with anti-HDAC-2 antibody. Following detection, the blot was stripped for a second time and re-probed with an actin-specific antibody to verify equal protein loading in the lanes.

As can be seen in Fig. 4, both HDAC-1 and HDAC-1 / 2 mismatch control oligonucleotides failed to inhibit HDAC-1 or HDAC-1 and HDAC-2 protein expression, respectively. Conversely, HDAC-1 antisense oligonucleotide effectively reduced expression of HDAC-1 protein, and HDAC-1 / 2 antisense oligonucleotide reduced protein expression of both HDAC-1 and HDAC-2.

#### Example 4

##### Identification of A Histone Deacetylase Involved in Induction of Cell Proliferation

Antisense oligonucleotides that inhibit expression of different histone deacetylases, according to the invention, are screened to identify a histone deacetylase that induces cell proliferation in cultured cells.

To identify a histone deacetylase that induces normal (*i.e.*, non-neoplastic) cell division, cultured normal human fibroblast cells are transfected with an antisense oligonucleotide that inhibits the expression of a histone deacetylase. While any standard transfection protocol may be employed, including, without limitation, CaPO<sub>4</sub> precipitation, electroporation, DEAE-dextran), transfection using the lipofectin transfection reagent (Gibco-BRL) is preferred. Following transfection with lipofectin and a histone deacetylase antisense oligonucleotide, cells are harvested by trypsinization at various time points, and counted using a hemacytometer or a Coulter Cell Counter. Mock transfected control cells (*i.e.*, treated with lipofectin plus a control, non-specific oligonucleotide) are also harvested and counted. Both the antisense oligonucleotide- and mock-transfected cells are also visually inspected



under a microscope for any phenotypic changes (*e.g.*, induction of apoptosis). An antisense oligonucleotide that inhibits the expression of a histone deacetylase that is found to inhibit cell proliferation when transfected into a normal cell identifies a histone deacetylase that is involved in induction of cell proliferation in normal cells.

- 5 To identify a histone deacetylase that induces neoplastic cell proliferation, T24 bladder carcinoma cells are transfected with histone deacetylase antisense oligonucleotides according to the invention and their growth pattern is observed and compared to that of untransfected control cells. For this purpose, one day before transfection, T24 cells (ATCC No. HTB-4) are plated onto 10 cm plates at  $4 \times 10^5$  cells/dish. At the time of transfection, 10 cells are washed with phosphate buffered saline (PBS) and 5 ml of Opti-MEM media (Gibco-BRL, Mississauga, Ontario) containing 6.25  $\mu\text{g/ml}$  lipofectin transfection reagent is added. The antisense oligonucleotides to be tested are diluted to the desired concentration from a 0.1 mM stock solution in the transfection media. After a four-hour incubation at 37°C in a 5% CO<sub>2</sub> incubator, the plates are washed with PBS and 10 ml of fresh cell culture media 15 is added. T24 cells are transfected for a total of three days and split every other day to ensure optimal transfection conditions. At various time points, cells are harvested by trypsinization and pelleted by centrifugation at 1100 rpm and 4°C for five minutes. The cells are resuspended in PBS and counted on a Coulter Particle Counter to determine the total cell number. Mock-transfected T24 cells (transfected with lipofectin and a control 20 oligonucleotide) are similarly grown, harvested, and counted. An antisense oligonucleotide that inhibits the expression of a histone deacetylase that is found to inhibit cell proliferation when transfected into a neoplastic cell identifies a histone deacetylase that is involved in induction of cell proliferation in neoplastic cells.

- By screening a number of different histone deacetylase antisense oligonucleotides in 25 normal and neoplastic cells, a histone deacetylase that is involved in induction of cell proliferation may be readily identified. Most preferably, a histone deacetylase antisense oligonucleotide of the invention is one that inhibits cell proliferation of neoplastic cells, but does not inhibit cell proliferation in normal cells.

30

### Example 5

#### A Histone Deacetylase Protein Inhibitor that Interacts With and Reduces the Enzymatic Activity of A Histone Deacetylase Involved in the Induction of Cell Proliferation

A histone deacetylase that is identified as being involved in the induction of cell proliferation (identified, for example, in the methods of Example 4), is used as a target for candidate compounds designed to interact with and inhibit its enzymatic activity. As a positive control, FR901228 (available from Fujisawa Pharmaceuticals), is used.

Candidate compounds can be derived from any source and may be naturally-occurring or synthetic, or may have naturally-occurring and synthetic components.

10 Candidate compounds may also be designed to chemically resemble any of the known histone deacetylase protein inhibitors, including, without limitation, trichostatin A, trichostatin C, trapoxin, depudecin, suberoylanilide hydroxamic acid (SAHA), FR901228, and butyrate.

Once candidate compounds are identified, a pool of such compounds may be added to a histone deacetylase. Such a histone deacetylase is preferably one that is identified using the antisense oligonucleotides of the invention as a histone deacetylase involved in induction of cell proliferation. The histone deacetylase may be purified, for example, by using antibodies specific to that particular histone deacetylase (*e.g.*, anti-HDAC-1 antibody commercially available from Santa Cruz Biotech.) or by recombinant production of the histone deacetylase in prokaryotic or eukaryotic cells. The histone deacetylase may also be present in a cell which normally expresses the histone deacetylase.

Pools of candidate compounds are added to the histone deacetylase, and the enzymatic activity of the histone deacetylase is measured. A pool of candidate compounds showing such a histone deacetylase inhibiting activity is sub-divided, and the subdivisions tested until one candidate compound is isolated having a histone deacetylase inhibiting activity. It will be understood that once a pool of candidate compounds is identified as having an ability to inhibit histone deacetylase enzymatic activity, the pool may be screened via various methods to ascertain the presence within the pool or one or more histone deacetylase protein inhibitor compounds. For example, if the pool is initially screened in a cell having a histone deacetylase, the pool may be subsequently screened on purified histone deacetylase.

Preferably, the candidate compound(s) found to be a histone deacetylase protein inhibitor inhibits the activity of fewer than all histone deacetylases. More preferably, such a candidate compound inhibits only those histone deacetylases that are involved in the induction of cell proliferation. Even more preferably, the candidate compound that is identified as a histone deacetylase protein inhibitor is one that inhibits only one histone deacetylase, where that one histone deacetylase is involved in the induction of cell proliferation. Most preferably, the candidate compound that is identified as a histone deacetylase protein inhibitor is one that inhibits only one histone deacetylase, where that one histone deacetylase is involved in the induction of cell proliferation in neoplastic cells, but is not involved in the induction of cell proliferation in normal cells.

In another method to identify a candidate compound that is a histone deacetylase protein inhibitor, purified histone deacetylase is allowed to adhere to the bottom of wells in a 96-well microtiter plate. Candidate compounds (or pools thereof) are then added to the plate, where each candidate compound has been modified with the covalent attachment of a detectable marker (*e.g.*, a biotin label). Binding of the candidate compound to the plate-bound histone deacetylase is detected via addition of a secondary reagent that binds to the detectable marker (*e.g.*, a streptavidin-labelled fluorophore), and subsequent analysis of the plate on a micro-titer plate reader. Candidate compounds thus identified which interact with purified histone deacetylase are then screened for an ability to inhibit the enzymatic activity of the histone deacetylase.

#### Example 6

##### Anti-Neoplastic Effect of Histone Deacetylase Antisense Oligonucleotide on Tumor Cells *in Vivo*

The purpose of this example is to illustrate the ability of the histone deacetylase antisense oligonucleotide of the invention to treat diseases responsive to histone deacetylase inhibition in animals, particularly mammals. This example further provides evidence of the ability of the methods and compositions of the invention to inhibit tumor growth in domesticated mammal. Eight to ten week old female BALB/c nude mice (Taconic Labs, Great Barrington, NY) are injected subcutaneously in the flank area with  $2 \times 10^6$  preconditioned A549 human lung carcinoma cells. Preconditioning of these cells is done by

a minimum of three consecutive tumor transplantations in the same strain of nude mice. Subsequently, tumor fragments of approximately 30 mgs are excised and implanted subcutaneously in mice, in the left flank area under Forene anesthesia (Abbott Labs., Geneva, Switzerland). When the tumors reaches a mean volume of 100 mm<sup>3</sup>, the mice are treated

5 intravenously, by daily bolous infusion into the tail vein, with oligonucleotide saline preparations containing 0.1-6 mg/kg of antisense oligonucleotide (Sigma, St. Louis, MO). The optimal final concentration of the oligonucleotide is established by dose response experiments according to standard protocols. Tumor volume is calculated according to standard methods every second day post infusion (*e.g.*, Meyer et al., Int. J. Cancer 43:851-

10 856 (1989)). Treatment with the oligonucleotides according to the invention causes a significant reduction in tumor weight and volume relative to controls treated with saline only (*i.e.*, no oligonucleotide) or controls treated with saline plus a control, non-specific oligonucleotide. In addition, the activity of histone deacetylase when measured is expected to be significantly reduced relative to saline treated controls.

15

#### Example 7

##### Synergistic Anti-Neoplastic Effect of Histone Deacetylase Antisense Oligonucleotide and Histone Deacetylase Protein Inhibitor on Tumor Cells *in Vivo*

The purpose of this example is to illustrate the ability of the histone deacetylase

20 antisense oligonucleotide and the histone deacetylase protein inhibitor of the invention to inhibit tumor growth in a mammal. As described in Example 6, mice bearing implanted A549 tumors (mean volume 100 mm<sup>3</sup>) are treated daily with saline preparations containing from about 0.1 mg to about 30 mg per kg body weight of histone deacetylase antisense oligonucleotide. A second group of mice is treated daily with pharmaceutically acceptable

25 preparations containing from about 0.01 mg to about 5 mg per kg body weight of histone deacetylase protein inhibitor. Some mice receive both the antisense oligonucleotide and the histone deacetylase protein inhibitor. Of these mice, one group may receive the antisense oligonucleotide and the histone deacetylase protein inhibitor simultaneously intravenously via the tail vein. Another group may receive the antisense oligonucleotide via the tail vein,

30 and the histone deacetylase protein inhibitor subcutaneously. Yet another group may receive both the antisense oligonucleotide and the histone deacetylase protein inhibitor

simultaneously via a subcutaneous injection. Control groups of mice are similarly established which receive no treatment (*e.g.*, saline only), a mismatch antisense oligonucleotide only, a control compound that does not inhibit histone deacetylase activity, and mismatch antisense oligonucleotide with control compound.

- 5 Tumor volume is measured with calipers. Treatment with the antisense oligonucleotide plus the histone deacetylase protein inhibitor according to the invention causes a significant reduction in tumor weight and volume relative to controls. Preferably, the antisense oligonucleotide and the histone deacetylase protein inhibitor inhibit the expression and activity of the same histone deacetylase.

What is claimed is:

1. An antisense oligonucleotide that inhibits the expression of a histone deacetylase.
- 5 2. The antisense oligonucleotide of claim 1, wherein the histone deacetylase is selected from the group consisting of HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, and HDAC-E.
- 10 3. The antisense oligonucleotide of claim 1, wherein the oligonucleotide inhibits more than one histone deacetylase.
4. The antisense oligonucleotide of claim 3, wherein the oligonucleotide inhibits all histone deacetylases.
- 15 5. The antisense oligonucleotide of claim 1, wherein the oligonucleotide inhibits transcription of a nucleic acid molecule encoding the histone deacetylase.
6. The oligonucleotide of claim 5, wherein the nucleic acid molecule is selected from the group consisting of genomic DNA, cDNA, and RNA.
- 20 7. The antisense oligonucleotide of claim 1, wherein the oligonucleotide inhibits translation of the histone deacetylase.
- 25 8. The antisense oligonucleotide of claim 1, wherein the oligonucleotide has at least one internucleotide linkage selected from the group consisting of phosphorothioate, phosphorodithioate, alkylphosphonate, alkylphosphonothioate, phosphotriester, phosphoramidate, siloxane, carbonate, carboxymethylester, acetamidate, carbamate, thioether, bridged phosphoramidate, bridged methylene phosphonate, bridged  
30 phosphorothioate, and sulfone internucleotide linkages.

9. The antisense oligonucleotide of claim 1, wherein the oligonucleotide is a chimeric oligonucleotide or a hybrid oligonucleotide.

10. The antisense oligonucleotide of claim 1, wherein the oligonucleotide  
5 comprises a ribonucleotide or 2'-O-substituted ribonucleotide region and a deoxyribonucleotide region.

11. A method for inhibiting a histone deacetylase in a cell comprising contacting  
10 the cell with the antisense oligonucleotide of claim 1.

12. The method of claim 11, wherein cell proliferation is inhibited in the contacted  
cell.

13. The method of claim 11, wherein the cell is a neoplastic cell.  
15

14. The method of claim 13, wherein neoplastic cell is in an animal.

15. The method of claim 14, wherein the neoplastic cell is in a neoplastic growth.

20 16. The method of claim 11 further comprising contacting the cell with a histone deacetylase protein inhibitor that interacts with and reduces the enzymatic activity of the histone deacetylase.

25 17. The method of claim 16, wherein the histone deacetylase protein inhibitor is operably associated with the antisense oligonucleotide.

18. A method for inhibiting neoplastic growth in an animal comprising  
administering to an animal having at least one neoplastic cell present in its body a  
therapeutically effective amount of the antisense oligonucleotide of claim 1 with a  
30 pharmaceutically acceptable carrier for therapeutically effective period of time.

19. The method of claim 18, wherein the animal is a mammal.
20. The method of claim 19, wherein the mammal is a human.
- 5 21. The method of claim 18 further comprising administering to the animal a therapeutically effective amount of a histone deacetylase protein inhibitor that interacts with and reduces the enzymatic activity of the histone deacetylase with a pharmaceutically acceptable carrier for a therapeutically effective period of time.
- 10 22. The method of claim 21, wherein the histone deacetylase protein inhibitor is operably associated with the antisense oligonucleotide.
23. A method for identifying a histone deacetylase that is involved in the induction of cell proliferation comprising contacting a cell with an antisense oligonucleotide  
15 that inhibits the expression of a histone deacetylase, wherein inhibition of cell proliferation in the contacted cell identifies the histone deacetylase as a histone deacetylase that is involved in the induction of cell proliferation.
24. The method of claim 23, wherein the cell is a neoplastic cell and the induction  
20 of cell proliferation is tumorigenesis.
25. The method of claim 23, wherein the histone deacetylase is selected from the group consisting of HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D, and HDAC-E.
- 25 26. A method for identifying a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in the induction of cell proliferation comprising contacting a histone deacetylase identified by the method of claim 23 with a candidate compound and measuring the enzymatic activity of the contacted histone deacetylase,  
30 wherein a reduction in the enzymatic activity of the contacted histone deacetylase identifies



the candidate compound as a histone deacetylase protein inhibitor that inhibits a histone deacetylase that is involved in the induction of cell proliferation.

27. The method of claim 26, wherein the histone deacetylase protein inhibitor  
5 interacts with and reduces the enzymatic activity of fewer than all histone deacetylases.

28. A method for identifying a histone deacetylase that is involved in the  
induction of cell differentiation comprising contacting a cell with an antisense  
oligonucleotide that inhibits the expression of a histone deacetylase, wherein induction of  
10 differentiation in the contacted cell identifies the histone deacetylase as a histone deacetylase  
that is involved in the induction of cell differentiation.

29. The method of claim 28, wherein the cell is a neoplastic cell.

15 30. The method of claim 28, wherein the histone deacetylase is selected from the  
group consisting of HDAC-1, HDAC-2, HDAC-3, HDAC-4, HDAC-5, HDAC-C, HDAC-D,  
and HDAC-E.

31. A method for identifying a histone deacetylase protein inhibitor that inhibits a  
20 histone deacetylase that is involved in the induction of cell differentiation comprising  
contacting a histone deacetylase identified by the method of claim 28 with a candidate  
compound and measuring the enzymatic activity of the contacted histone deacetylase,  
wherein a reduction in the enzymatic activity of the contacted histone deacetylase identifies  
the candidate compound as a histone deacetylase protein inhibitor that inhibits a histone  
25 deacetylase that is involved in the induction of cell differentiation.

32. The method of claim 31, wherein the histone deacetylase protein inhibitor  
interacts with and reduces the enzymatic activity of fewer than all histone deacetylases.

30 33. A histone deacetylase protein inhibitor identified by the method of claim 26 or  
31.

34. The histone deacetylase protein inhibitor is substantially pure.

35. A method for inhibiting cell proliferation in a cell comprising contacting a cell  
5 with at least two of the reagents selected from the group consisting of an antisense  
oligonucleotide that inhibits a histone deacetylase, a histone deacetylase protein inhibitor, an  
antisense oligonucleotide that inhibits a DNA methyltransferase, and a DNA  
methyltransferase protein inhibitor.

10 36. The method of claim 35, wherein the inhibition of cell growth of the contacted  
cell is greater than the inhibition of cell growth of a cell contacted with only one of the  
reagents.

37. The method of claim 35, wherein the each of the reagents selected from the  
15 group is substantially pure.

38. The method of claim 35, wherein the cell is a neoplastic cell.

39. The method of claim 35, wherein the reagents selected from the group are  
20 operably associated.

Dose Dependent Inhibition of HDAC 1 or 1,2 mRNA  
by First Generation Antisense Oligonucleotides

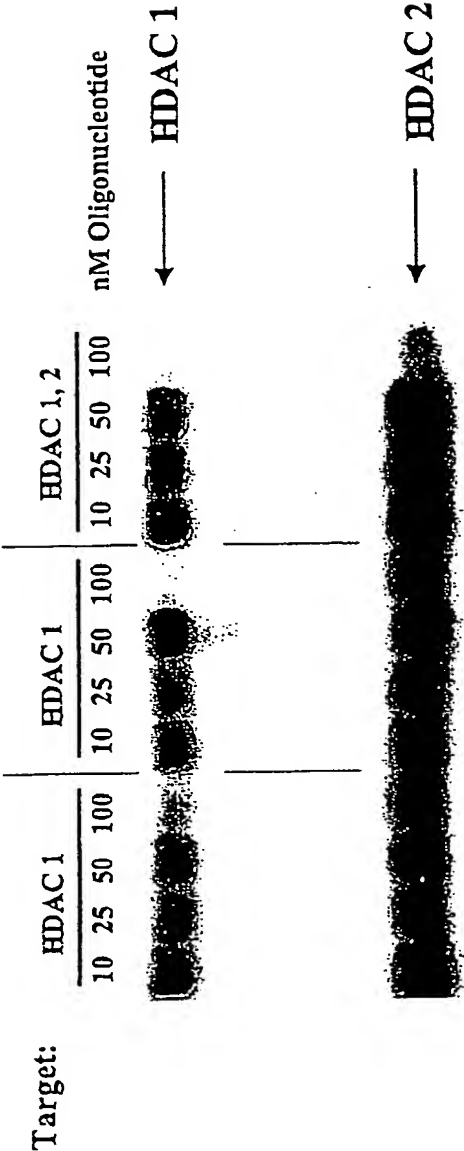


FIGURE 1

# Dose dependent inhibition of HDAC 2 mRNA by Antisense Oligonucleotides

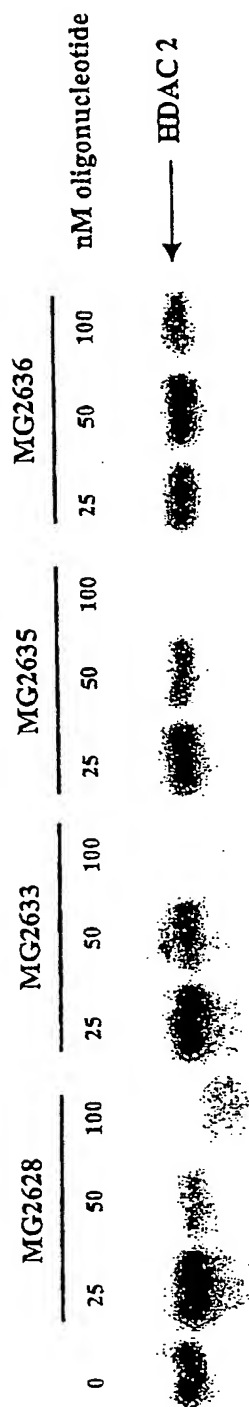


FIGURE 2

## Isotypic Pharmacology

Specific Inhibition of HDAC 2 isozyme by Second  
Generation Antisense Oligonucleotides

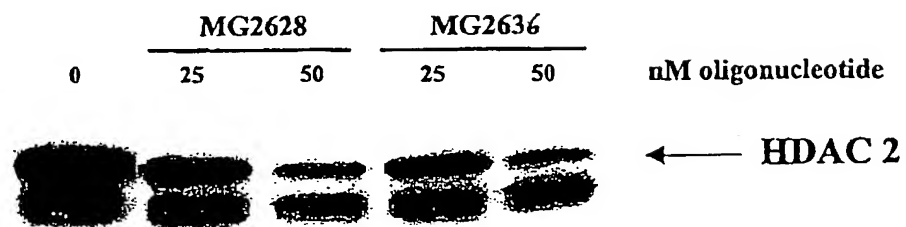
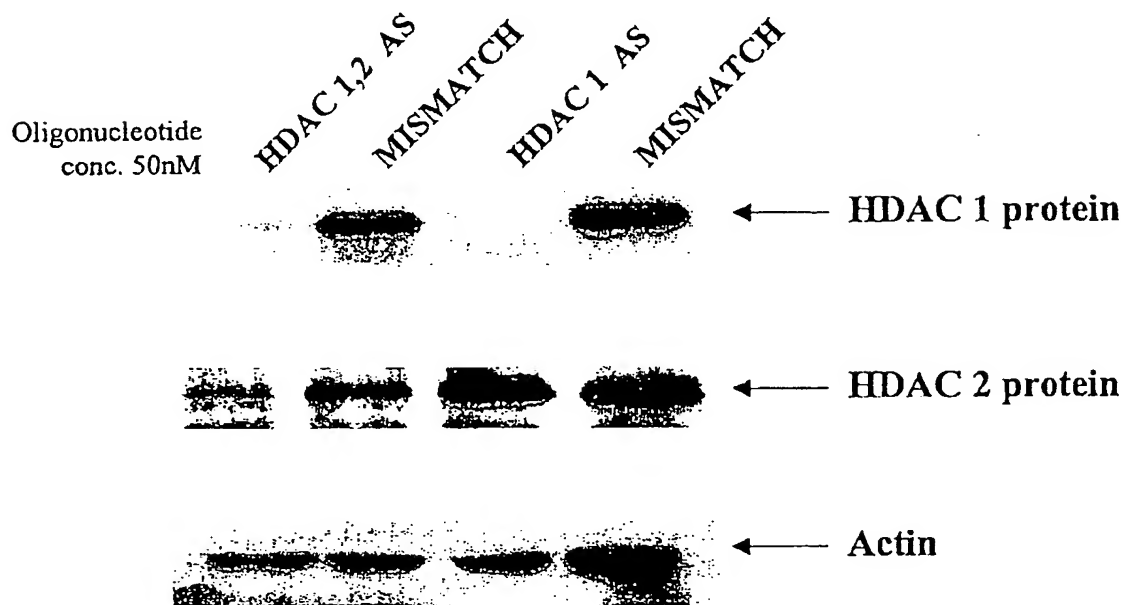


FIGURE 3

## Isotypic Pharmacology

Specific Inhibition of HDAC 1 or 2 isozymes by  
Second Generation Antisense Oligonucleotides



## Goal: Target Validation

Determine outcome of specific HDAC isotype inhibition.  
Tailor HDAC small molecule inhibitor program to  
isotypic pharmacology results.

FIGURE 4

## SEQUENCE LISTING

<110> MacLeod, Alan R  
Li, Zoumei  
Besterman, Jeffrey M

<120> Inhibition of Histone Deacetylase

<130> 106101.229

<140>

<141>

<150> 60/132,287

<151> 1999-05-03

<160> 36

<170> PatentIn Ver. 2.1

<210> 1

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 1

gaaacgtgag ggactcagca

20

<210> 2

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 2

cagcaaatta tgggtcatgc ggattc

26

<210> 3

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 3

cagcaagtta tgagtcatgc ggattc

26

<210> 4

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 4

cagcaaatta tgagtcatgc ggattc

26

<210> 5

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 5

cagcaagtta tgggtcatgc ggattc

26

<210> 6

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 6

tgctgctgct gctgctgccg

20

<210> 7

<211> 20

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 7

cctcctgctg ctgctgctgc

20

<210> 8

<211> 20



<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 8  
ggttcctttg gtatctgttt

20

<210> 9  
<211> 20  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: synthetic  
oligonucleotide

<400> 9  
ctccttgact gtacgccatg

20

<210> 10  
<211> 20  
<212> Combined DNA/RNA Molecule  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 17-20 are 2'-methoxyribose  
substituted nucleotides; positions 5-16 are  
deoxyribonucleotides

<400> 10  
gaaacgtgag ggactcagca

20

<210> 11  
<211> 26  
<212> Combined DNA/RNA Molecule  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 11  
cagcaaatta tgggtcatgc ggauuc

26

<210> 12  
<211> 26  
<212> Combined DNA/RNA Molecule

<213> Homo sapiens

<220>

<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 12

cagcaagtta tgagtcatgc ggauuc

26

<210> 13

<211> 26

<212> Combined DNA/RNA Molecule

<213> Artificial Sequence

<220>

<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 13

cagcaaatta tgagtcatgc ggauuc

26

<210> 14

<211> 26

<212> Combined DNA/RNA Molecule

<213> Artificial Sequence

<220>

<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 14

cagcaagtta tgggtcatgc ggauuc

26

<210> 15

<211> 20

<212> Combined DNA/RNA Molecule

<213> Artificial Sequence

<220>

<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 17-20 are 2'-methoxyribose  
substituted nucleotides; positions 5-16 are  
deoxyribonucleotides

<400> 15

ugcugctgct gctgctgccg

20

<210> 16

<211> 20  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 17-20 are 2'-methoxyribose  
substituted nucleotides; positions 5-16 are  
deoxyribonucleotides

<400> 16  
ccucctgctg ctgctgcgc 20

<210> 17  
<211> 20  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 17-20 are 2'-methoxyribose  
substituted nucleotides; positions 5-16 are  
deoxyribonucleotides

<400> 17  
gguucctttg gtatctguuu 20

<210> 18  
<211> 20  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 17-20 are 2'-methoxyribose  
substituted nucleotides; positions 5-16 are  
deoxyribonucleotides

<400> 18  
cuccttgact gtacgccaug 20

<210> 19  
<211> 20  
<212> Combined DNA/RNA Molecule  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 17-20 are 2'-methoxyribose  
substituted nucleotides; positions 5-16 are  
deoxyribonucleotides

<400> 19  
caaucgtcag agactccgaa 20

<210> 20  
<211> 26  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 20  
aaggaagtca tgaatgatgc ccuauug

26

<210> 21  
<211> 26  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 21  
aaggaaatca tggatgatgc ccuauug

26

<210> 22  
<211> 26  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 22  
aaggaagtca tggatgatgc ccattg

26

<210> 23  
<211> 26  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Combined DNA/RNA Molecule:  
Positions 1-4 and 23-26 are 2'-methoxyribose  
substituted nucleotides; positions 5-22 are  
deoxyribonucleotides

<400> 23  
aaggaaatca tgaatgatgc ccattg

26

<210> 24  
<211> 482  
<212> PRT  
<213> Homo sapiens

<400> 24  
Met Ala Gln Thr Gln Gly Thr Arg Arg Lys Val Cys Tyr Tyr Tyr Asp  
1 5 10 15  
Gly Asp Val Gly Asn Tyr Tyr Tyr Gly Gln Gly His Pro Met Lys Pro  
20 25 30  
His Arg Ile Arg Met Thr His Asn Leu Leu Leu Asn Tyr Gly Leu Tyr  
35 40 45  
Arg Lys Met Glu Ile Tyr Arg Pro His Lys Ala Asn Ala Glu Glu Met  
50 55 60  
Thr Lys Tyr His Ser Asp Asp Tyr Ile Lys Phe Leu Arg Ser Ile Arg  
65 70 75 80  
Pro Asp Asn Met Ser Glu Tyr Ser Lys Gln Met Gln Arg Phe Asn Val  
85 90 95  
Gly Glu Asp Cys Pro Val Phe Asp Gly Leu Phe Glu Phe Cys Gln Leu  
100 105 110  
Ser Thr Gly Gly Ser Val Ala Ser Ala Val Lys Leu Asn Lys Gln Gln  
115 120 125  
Thr Asp Ile Ala Val Asn Trp Ala Gly Gly Leu His His Ala Lys Lys  
130 135 140  
Ser Glu Ala Ser Gly Phe Cys Tyr Val Asn Asp Ile Val Leu Ala Ile  
145 150 155 160  
Leu Glu Leu Leu Lys Tyr His Gln Arg Val Leu Tyr Ile Asp Ile Asp  
165 170 175  
Ile His His Gly Asp Gly Val Glu Glu Ala Phe Tyr Thr Thr Asp Arg  
180 185 190  
Val Met Thr Val Ser Phe His Lys Tyr Gly Glu Tyr Phe Pro Gly Thr  
195 200 205  
Gly Asp Leu Arg Asp Ile Gly Ala Gly Lys Gly Lys Tyr Tyr Ala Val  
210 215 220  
Asn Tyr Pro Leu Arg Asp Gly Ile Asp Asp Glu Ser Tyr Glu Ala Ile  
225 230 235 240  
Phe Lys Pro Val Met Ser Lys Val Met Glu Met Phe Gln Pro Ser Ala

245                                      250                                      255  
 Val Val Leu Gln Cys Gly Ser Asp Ser Leu Ser Gly Asp Arg Leu Gly  
    260                                      265                                      270  
 Cys Phe Asn Leu Thr Ile Lys Gly His Ala Lys Cys Val Glu Phe Val  
    275                                      280                                      285  
 Lys Ser Phe Asn Leu Pro Met Leu Met Leu Gly Gly Gly Tyr Thr  
    290                                      295                                      300  
 Ile Arg Asn Val Ala Arg Cys Trp Thr Tyr Glu Thr Ala Val Ala Leu  
 305                                      310                                      315                                      320  
 Asp Thr Glu Ile Pro Asn Glu Leu Pro Tyr Asn Asp Tyr Phe Glu Tyr  
    325                                      330                                      335  
 Phe Gly Pro Asp Phe Lys Leu His Ile Ser Pro Ser Asn Met Thr Asn  
    340                                      345                                      350  
 Gln Asn Thr Asn Glu Tyr Leu Glu Lys Ile Lys Gln Arg Leu Phe Glu  
    355                                      360                                      365  
 Asn Leu Arg Met Leu Pro His Ala Pro Gly Val Gln Met Gln Ala Ile  
    370                                      375                                      380  
 Pro Glu Asp Ala Ile Pro Glu Glu Ser Gly Asp Glu Asp Glu Asp Asp  
 385                                      390                                      395                                      400  
 Pro Asp Lys Arg Ile Ser Ile Cys Ser Ser Asp Lys Arg Ile Ala Cys  
    405                                      410                                      415  
 Glu Glu Glu Phe Ser Asp Ser Glu Glu Glu Gly Glu Gly Arg Lys  
    420                                      425                                      430  
 Asn Ser Ser Asn Phe Lys Lys Ala Lys Arg Val Lys Thr Glu Asp Glu  
    435                                      440                                      445  
 Lys Glu Lys Asp Pro Glu Glu Lys Lys Glu Val Thr Glu Glu Glu Lys  
    450                                      455                                      460  
 Thr Lys Glu Glu Lys Pro Glu Ala Lys Gly Val Lys Glu Glu Val Lys  
 465                                      470                                      475                                      480  
 Leu Ala

<210> 25  
 <211> 1611  
 <212> DNA  
 <213> Homo sapiens

<400> 25  
 atgtctgggg tctctgcccg ctggtgtgtgc tgtctccac tcggtcatcc tgagaacaca 60  
 gcctgagcgt ctctgtcact cggggtagac cagcgggga ggcgagcaag atggcgaga 120  
 cgcagggcac ccggaggaaa gtctgttact actacgacgg ggatgttgga aattactatt 180

```

atggacaagg ccacccaatg aagcctcacc gaatccgcat gactcataat ttgctgctca 240
actatggtct ctaccgaaaa atggaaatct atcgccctca caaagccaat gctgaggaga 300
tgaccaagta ccacagcgat gactacatta aattcttgcg ctccatccgt ccagataaca 360
tgtcggagta cagcaagcag atgcagagat tcaacgttgg tgaggactgt ccagtattcg 420
atggcctgtt tgagttctgt cagttgtcta ctggtggttc tgtggcaagt gctgtgaaac 480
ttaataagca gcagacggac atcgctgtga attgggctgg gggcctgcac catgcaaaga 540
agtccgaggc atctggcttc tgttacgtca atgatatcgt cttggccatc ctggaactgc 600
taaagtatca ccagagggtg ctgtacattg acattgatat tcaccatggt gacggcgtgg 660
aagaggcctt ctacaccacg gaccgggtca tgactgtgtc ctttcataag tatggagagt 720
acttcccagg aactggggac ctacgggata tcggggctgg caaaggcaag tattatgctg 780
ttaactaccc gctccgagac gggattgatg acgagtccta tgaggccatt ttcaagccgg 840
tcatgtccaa agtaatggag atgttccagc ctagtgcggt ggtcttacag tgtggctcag 900
actccctatc tggggatcgg ttaggttgct tcaatctaac tatcaaagga cacgccaagt 960
gtgtggaatt tgtaagagc tttaacctgc ctatgctgat gctgggagggc ggtggttaca 1020
ccattcgtaa cgttgcccg tgcctggacat atgagacagc tgtggccctg gatacggaga 1080
tccctaatag gcttccatac aatgactact ttgaatactt tggaccagat ttcaagctcc 1140
acatcagtc ttccaatatg actaaccaga acacgaatga gtacctggag aagatcaaac 1200
agcgactgtt tgagaacctt agaatgctgc cgcacgcacc tgggggtccaa atgcaggcga 1260
ttcctgagga cgccatccct gaggagagtg gcgatgagga cgaagacgac cctgacaagc 1320
gcatctcgat ctgctcctct gacaaacgaa ttgctgtga ggaagagtcc tccgattctg 1380
aagaggaggg agaggggggc cgcaagaact cttccaactt caaaaaagcc aagagagtca 1440
aaacagagga tgaaaagag aaagacccag aggagaagaa agaagtcacc gaagaggaga 1500
aaaccaagga ggagaagcca gaagccaaag ggggtcaagga ggaggtcaag ttggcctgaa 1560
tggaacctctc cagctctggc ttctgtgtga gtcctcacc tttctttccc c 1611

```

&lt;210&gt; 26

&lt;211&gt; 488

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 26

```

Met Ala Tyr Ser Gln Gly Gly Gly Lys Lys Lys Val Cys Tyr Tyr Tyr
 1             5             10             15

Asp Gly Asp Ile Gly Asn Tyr Tyr Tyr Gly Gln Gly His Pro Met Lys
      20             25             30

Pro His Arg Ile Arg Met Thr His Asn Leu Leu Leu Asn Tyr Gly Leu
      35             40             45

Tyr Arg Lys Met Glu Ile Tyr Arg Pro His Lys Ala Thr Ala Glu Glu
      50             55             60

Met Thr Lys Tyr His Ser Asp Glu Tyr Ile Lys Phe Leu Arg Ser Ile
      65             70             75             80

Arg Pro Asp Asn Met Ser Glu Tyr Ser Lys Gln Met His Ile Phe Asn
      85             90             95

Val Gly Glu Asp Cys Pro Ala Phe Asp Gly Leu Phe Glu Phe Cys Gln
      100            105            110

Leu Ser Thr Gly Gly Ser Val Ala Gly Ala Val Lys Leu Asn Arg Gln
      115            120            125

Gln Thr Asp Met Ala Val Asn Trp Ala Gly Gly Leu His His Ala Lys

```

130                      135                      140  
 Lys Tyr Glu Ala Ser Gly Phe Cys Tyr Val Asn Asp Ile Val Leu Ala  
 145                      150                      155                      160  
 Ile Leu Glu Leu Leu Lys Tyr His Gln Arg Val Leu Tyr Ile Asp Ile  
 165                      170                      175  
 Asp Ile His His Gly Asp Gly Val Glu Glu Ala Phe Tyr Thr Thr Asp  
 180                      185                      190  
 Arg Val Met Thr Val Ser Phe His Lys Tyr Gly Glu Tyr Phe Pro Gly  
 195                      200                      205  
 Thr Gly Asp Leu Arg Asp Ile Gly Ala Gly Lys Gly Lys Tyr Tyr Ala  
 210                      215                      220  
 Val Asn Phe Pro Met Cys Asp Gly Ile Asp Asp Glu Ser Tyr Gly Gln  
 225                      230                      235                      240  
 Ile Phe Lys Pro Ile Ile Ser Lys Val Met Glu Met Tyr Gln Pro Ser  
 245                      250                      255  
 Ala Val Val Leu Gln Cys Gly Ala Asp Ser Leu Ser Gly Asp Arg Leu  
 260                      265                      270  
 Gly Cys Phe Asn Leu Thr Val Lys Gly His Ala Lys Cys Val Glu Val  
 275                      280                      285  
 Val Lys Thr Phe Asn Leu Pro Leu Leu Met Leu Gly Gly Gly Tyr  
 290                      295                      300  
 Thr Ile Arg Asn Val Ala Arg Cys Trp Thr Tyr Glu Thr Ala Val Ala  
 305                      310                      315                      320  
 Leu Asp Cys Glu Ile Pro Asn Glu Leu Pro Tyr Asn Asp Tyr Phe Glu  
 325                      330                      335  
 Tyr Phe Gly Pro Asp Phe Lys Leu His Ile Ser Pro Ser Asn Met Thr  
 340                      345                      350  
 Asn Gln Asn Thr Pro Glu Tyr Met Glu Lys Ile Lys Gln Arg Leu Phe  
 355                      360                      365  
 Glu Asn Leu Arg Met Leu Pro His Ala Pro Gly Val Gln Met Gln Ala  
 370                      375                      380  
 Ile Pro Glu Asp Ala Val His Glu Asp Ser Gly Asp Glu Asp Gly Glu  
 385                      390                      395                      400  
 Asp Pro Asp Lys Arg Ile Ser Ile Arg Ala Ser Asp Lys Arg Ile Ala  
 405                      410                      415  
 Cys Asp Glu Glu Phe Ser Asp Ser Glu Asp Glu Gly Glu Gly Arg  
 420                      425                      430  
 Arg Asn Val Ala Asp His Lys Lys Gly Ala Lys Lys Ala Arg Ile Glu



435                      440                      445  
 Glu Asp Lys Lys Glu Thr Glu Asp Lys Lys Thr Asp Val Lys Glu Glu  
 450                      455                      460  
 Asp Lys Ser Lys Asp Asn Ser Gly Glu Lys Thr Asp Thr Lys Gly Thr  
 465                      470                      475                      480  
 Lys Ser Glu Gln Leu Ser Asn Pro  
 485

<210> 27  
 <211> 1985  
 <212> DNA  
 <213> Homo sapiens

<400> 27  
 cgccgagctt tcggcacctc tgccgggtgg taccgagcct tcccggcgcc ccctcctctc 60  
 ctcccaccgg cctgcccttc ccgcggggac tatcgcccc acgtttccct cagccctttt 120  
 ctctcccggc cgagccggcg cggcagcagc agcagcagca gcagcaggag gaggagcccc 180  
 gtggcgggcg tgcccgggga gcccatggcg tacagtcaag gaggcggcaa aaaaaaagtc 240  
 tgctactact acgacgggtga tattggaaat tattattatg gacaggggtca tcccatgaag 300  
 cctcatagaa tccgcatgac ccataacttg ctgttaaatt atggcttata cagaaaaatg 360  
 gaaatatata ggccccataa agccactgcc gaagaaatga caaaatatca cagtgatgag 420  
 tataatcaaat ttctacgggtc aataagacca gataacatgt ctgagtatag taagcagatg 480  
 catatatatta atgttggaga agattgtcca gcgtttgatg gactctttga gttttgtcag 540  
 ctctcaactg gcggttcagt tgctggagct gtgaagttaa accgacaaca gactgatatg 600  
 gctgttaatt gggctggagg attacatcat gctaagaaat acgaagcatc aggattctgt 660  
 tacgttaatg atattgtgct tgccatcctt gaattactaa agtatcatca gagagtctta 720  
 tatattgata tagatattca tcatggtgat ggtgttgaag aaagctttta tacaacagat 780  
 cgtgtaatga cgggtatcatt ccataaatat ggggaatact ttcctggcac aggagacttg 840  
 agggatattg gtgctggaaa aggcaaatac tatgctgtca attttccaat gtgtgatggt 900  
 atagatgatg agtcatatgg gcagatatat aagcctatta tctcaaaggt gatggagatg 960  
 tatcaacctg gtgctgtggt attacagtgt ggtgcagact cattatctgg tgatagactg 1020  
 gggtgtttca atctaacagt caaaggtcat gctaaatgtg tagaagttgt aaaaactttt 1080  
 aacttaccat tactgatgct tggaggaggt ggctacacaa tccgtaatgt tgctcgatgt 1140  
 tggacatatg agactgcagt tgcccttgat tgtgagattc ccaatgagtt gccatataat 1200  
 gattactttg agtatttttg accagacttc aaactgcata ttagtccttc aaacatgaca 1260  
 aaccagaaca ctccagaata tatggaaaag ataaaacagc gtttgtttga aaatttgcg 1320  
 atgttacctc atgcacctgg tgtccagatg caagctattc cagaagatgc tgttcatgaa 1380  
 gacagtggag atgaagatgg agaagatcca gacaagagaa tttctattcg agcatcagac 1440  
 aagcggatag cttgtgatga agaattctca gattctgagg atgaaggaga aggaggtcga 1500  
 agaaatgtgg ctgatcataa gaaaggagca aagaaagcta gaattgaaga agataagaaa 1560  
 gaaacagagg acaaaaaaac agacgttaag gaagaagata aatccaagga caacagtgg 1620  
 gaaaaaacag ataccaaagg aaccaaatac gaacagctca gcaaccctg aatttgacag 1680  
 tctcaccaat ttcagaaaat cattaaaaag aaaatattga aaggaaaaatg ttttctttt 1740  
 gaagacttct ggcttcattt tatactactt tggcatggac tgtattttatt ttcaaatggg 1800  
 actttttcgt ttttgttttt ctgggcaagt tttattgtga gattttctaa ttatgaagca 1860  
 aaatttcttt tctccaccat gctttatgtg atagtattta aaattgatgt gagttattat 1920  
 gtcaaaaaaa ctgatctatt aaagaagtaa ttggcctttc tgagctgaaa aaaaaaaaaa 1980  
 aaaag

<210> 28  
 <211> 428  
 <212> PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 28

Met Ala Lys Thr Val Ala Tyr Phe Tyr Asp Pro Asp Val Gly Asn Phe  
 1 5 10 15  
 His Tyr Gly Ala Gly His Pro Met Lys Pro His Arg Leu Ala Leu Thr  
 20 25 30  
 His Ser Leu Val Leu His Tyr Gly Leu Tyr Lys Lys Met Ile Val Phe  
 35 40 45  
 Lys Pro Tyr Gln Ala Ser Gln His Asp Met Cys Arg Phe His Ser Glu  
 50 55 60  
 Asp Tyr Ile Asp Phe Leu Gln Arg Val Ser Pro Thr Asn Met Gln Gly  
 65 70 75 80  
 Phe Thr Lys Ser Leu Asn Ala Phe Asn Val Gly Asp Asp Cys Pro Val  
 85 90 95  
 Phe Pro Gly Leu Phe Glu Phe Cys Ser Arg Tyr Thr Gly Ala Ser Leu  
 100 105 110  
 Gln Gly Ala Thr Gln Leu Asn Asn Lys Ile Cys Asp Ile Ala Ile Asn  
 115 120 125  
 Trp Ala Gly Gly Leu His His Ala Lys Lys Phe Glu Ala Ser Gly Phe  
 130 135 140  
 Cys Tyr Val Asn Asp Ile Val Ile Gly Ile Leu Glu Leu Leu Lys Tyr  
 145 150 155 160  
 His Pro Arg Val Leu Tyr Ile Asp Ile Asp Ile His His Gly Asp Gly  
 165 170 175  
 Val Gln Glu Ala Phe Tyr Leu Thr Asp Arg Val Met Thr Val Ser Phe  
 180 185 190  
 His Lys Tyr Gly Asn Tyr Phe Phe Pro Gly Thr Gly Asp Met Tyr Glu  
 195 200 205  
 Val Gly Ala Glu Ser Gly Arg Tyr Tyr Cys Leu Asn Val Pro Leu Arg  
 210 215 220  
 Asp Gly Ile Asp Asp Gln Ser Tyr Lys His Leu Phe Gln Pro Val Ile  
 225 230 235 240  
 Asn Gln Val Val Asp Phe Tyr Gln Pro Thr Cys Ile Val Leu Gln Cys  
 245 250 255  
 Gly Ala Asp Ser Leu Gly Cys Asp Arg Leu Gly Cys Phe Asn Leu Ser  
 260 265 270  
 Ile Arg Gly His Gly Glu Cys Val Glu Tyr Val Lys Ser Phe Asn Ile  
 275 280 285

Pro Leu Leu Val Leu Gly Gly Gly Gly Tyr Thr Val Arg Asn Val Ala  
290 295 300

Arg Cys Trp Thr Tyr Glu Thr Ser Leu Leu Val Glu Glu Ala Ile Ser  
305 310 315 320

Glu Glu Leu Pro Tyr Ser Glu Tyr Phe Glu Tyr Phe Ala Pro Asp Phe  
325 330 335

Thr Leu His Pro Asp Val Ser Thr Arg Ile Glu Asn Gln Asn Ser Arg  
340 345 350

Gln Tyr Leu Asp Gln Ile Arg Gln Thr Ile Phe Glu Asn Leu Lys Met  
355 360 365

Leu Asn His Ala Pro Ser Val Gln Ile His Asp Val Pro Ala Asp Leu  
370 375 380

Leu Thr Tyr Asp Arg Thr Asp Glu Ala Asp Ala Glu Glu Arg Gly Pro  
385 390 395 400

Glu Glu Asn Tyr Ser Arg Pro Glu Ala Pro Asn Glu Phe Tyr Asp Gly  
405 410 415

Asp His Asp Asn Asp Lys Glu Ser Asp Val Glu Ile  
420 425

<210> 29

<211> 1954

<212> DNA

<213> Homo sapiens

<400> 29

ggaattcgcg gccgcggcgg ggcgcgggagg tgcggggcct gctcccgcgc gcaccatggc 60  
caagaccgtg gcctatttct acgaccccgga cgtggggcaac ttccactacg gagctggaca 120  
ccctatgaag ccccatcgcc tggcattgac ccatagcctg gtccctgcatt acggtctcta 180  
taagaagatg atcgctctca agccatacca ggcctcccaa catgacatgt gccgcttcca 240  
ctccgaggac tacattgact tcctgcagag agtcagcccc accaatatgc aaggcttcac 300  
caagagtctt aatgccttca acgtaggcga tgactgcca gtgtttcccg ggctcttga 360  
gttctgctcg cgttacacag ggcctctctt gcaaggagca acccagctga acaacaagat 420  
ctgtgatatt gccattaact gggctgggtg tctgcacat gccagaagt ttgaggcctc 480  
tggtctctgc tatgtcaacg acattgtgat tggcctcctg gagctgctca agtaccacc 540  
tcgggtgctc tacattgaca ttgacatcca ccatggtgac ggggttcaag aagctttcta 600  
cctcactgac cgggtcatga cgggtgctct ccacaaatac ggaaattact tcttccctgg 660  
cacagggtgac atgtatgaag tcggggcaga gactggcgc tactactgtc tgaacgtgcc 720  
cctgcgggat ggcattgatg accagagtta caagcacctt ttccagccgg ttatcaacca 780  
ggtagtggac ttctaccaac ccacgtgcat tgtgtccag tgtggagctg actctctggg 840  
ctgtgatcga ttgggtgct ttaacctcag catccgaggg catggggaat gcgttgaata 900  
tgtcaagagc ttcaatatcc ctctactcgt gctgggtggt ggtgggtata ctgtccgaaa 960  
tgttgccgc tgctggacat atgagacatc gctgtggtga gaagaggcca ttagtgagga 1020  
gcttccctat agtgaatact tcgagtactt cgccacagac ttcacacttc atccagatgt 1080  
cagcaccgc atcgagaatc agaactcacg ccagtatctg gaccagatcc gccagacaat 1140  
ctttgaaaac ctgaagatgc tgaacctatg acctagtgtc cagattcatg acgtgcctgc 1200  
agacctcctg acctatgaca ggactgatga ggctgatgca gaggagaggg gtcctgagga 1260  
gaactatagc aggccagagg cacccaatga gttctatgat ggagaccatg acaatgacaa 1320  
ggaaagcgat gtggagattt aagagtggct tgggatgctg tgtcccaagg aatttctttt 1380

```

cacctcttgg aagggtgga gggaaaagga gtggctccta gagtctggg ggtcacccca 1440
ggggcttttg ctgactctgg gaaagagtct ggagaccaca ttgggttctc gaaccatcta 1500
cctgcttttc ctctctctcc caaggactga caatggtacc tattagggat gagatacaga 1560
caaggatagc tatctgggac attattggca gtgggccctg gaggcagtcc ctageccccc 1620
ttgcccctta tttcttcctt gcttcctctg aaccagaga tttttgaggg atgaacgggt 1680
agacaaggac tgagattgcc tctgacttcc tcctccctg ggttctgacc ttcttcctcc 1740
ccttgcttcc agggaagatg aagagagaga gatttgggaag gggctctggc tccctaacac 1800
ctgaatccca gatgatggga agtatgtttt caagtgtggg gaggatatga aaatgttctg 1860
ttctcacttt tggctttatg tccattttac cactgttttt atccaataaa ctaagtcggt 1920
attttttgta cttttgatgg tttagcggcc gcgc 1954

```

<210> 30  
 <211> 967  
 <212> PRT  
 <213> Homo sapiens

<400> 30  
 Met Leu Ala Met Lys His Gln Gln Glu Leu Leu Glu His Gln Arg Lys  
 1 5 10 15  
 Leu Glu Arg His Arg Gln Glu Gln Glu Leu Glu Lys Gln His Arg Glu  
 20 25 30  
 Gln Lys Leu Gln Gln Leu Lys Asn Lys Glu Lys Gly Lys Glu Ser Ala  
 35 40 45  
 Val Ala Ser Thr Glu Val Lys Met Lys Leu Gln Glu Phe Val Leu Asn  
 50 55 60  
 Lys Lys Lys Ala Leu Ala His Arg Asn Leu Asn His Cys Ile Ser Ser  
 65 70 75 80  
 Asp Pro Arg Tyr Trp Tyr Gly Lys Thr Gln His Ser Ser Leu Asp Gln  
 85 90 95  
 Ser Ser Pro Pro Gln Ser Gly Val Ser Thr Ser Tyr Asn His Pro Val  
 100 105 110  
 Leu Gly Met Tyr Asp Ala Lys Asp Asp Phe Pro Leu Arg Lys Thr Ala  
 115 120 125  
 Ser Glu Pro Asn Leu Lys Leu Arg Ser Arg Leu Lys Gln Lys Val Ala  
 130 135 140  
 Glu Arg Arg Ser Ser Pro Leu Leu Arg Arg Lys Asp Gly Pro Val Val  
 145 150 155 160  
 Thr Ala Leu Lys Lys Arg Pro Leu Asp Val Thr Asp Ser Ala Cys Ser  
 165 170 175  
 Ser Ala Pro Gly Ser Gly Pro Ser Ser Pro Asn Asn Ser Ser Gly Ser  
 180 185 190  
 Val Ser Ala Glu Asn Gly Ile Ala Pro Ala Val Pro Ser Ile Pro Ala  
 195 200 205

Glu Thr Ser Leu Ala His Arg Leu Val Ala Arg Glu Gly Ser Ala Ala  
 210 215 220  
 Pro Leu Pro Leu Tyr Thr Ser Pro Ser Leu Pro Asn Ile Thr Leu Gly  
 225 230 235 240  
 Leu Pro Ala Thr Gly Pro Ser Ala Gly Thr Ala Gly Gln Gln Asp Thr  
 245 250 255  
 Glu Arg Leu Thr Leu Pro Ala Leu Gln Gln Arg Leu Ser Leu Phe Pro  
 260 265 270  
 Gly Thr His Leu Thr Pro Tyr Leu Ser Thr Ser Pro Leu Glu Arg Asp  
 275 280 285  
 Gly Gly Ala Ala His Ser Pro Leu Leu Gln His Met Val Leu Leu Glu  
 290 295 300  
 Gln Pro Pro Ala Gln Ala Pro Leu Val Thr Gly Leu Gly Ala Leu Pro  
 305 310 315 320  
 Leu His Ala Gln Ser Leu Val Gly Ala Asp Arg Val Ser Pro Ser Ile  
 325 330 335  
 His Lys Leu Arg Gln His Arg Pro Leu Gly Arg Thr Gln Ser Ala Pro  
 340 345 350  
 Leu Pro Gln Asn Ala Gln Ala Leu Gln His Leu Val Ile Gln Gln Gln  
 355 360 365  
 His Gln Gln Phe Leu Glu Lys His Lys Gln Gln Phe Gln Gln Gln Gln  
 370 375 380  
 Leu Gln Met Asn Lys Ile Ile Pro Lys Pro Ser Glu Pro Ala Arg Gln  
 385 390 395 400  
 Pro Glu Ser His Pro Glu Glu Thr Glu Glu Glu Leu Arg Glu His Gln  
 405 410 415  
 Ala Leu Leu Asp Glu Pro Tyr Leu Asp Arg Leu Pro Gly Gln Lys Glu  
 420 425 430  
 Ala His Ala Gln Ala Gly Val Gln Val Lys Gln Glu Pro Ile Glu Ser  
 435 440 445  
 Asp Glu Glu Glu Ala Glu Pro Pro Arg Glu Val Glu Pro Gly Gln Arg  
 450 455 460  
 Gln Pro Ser Glu Gln Glu Leu Leu Phe Arg Gln Gln Ala Leu Leu Leu  
 465 470 475 480  
 Glu Gln Gln Arg Ile His Gln Leu Arg Asn Tyr Gln Ala Ser Met Glu  
 485 490 495  
 Ala Ala Gly Ile Pro Val Ser Phe Gly Gly His Arg Pro Leu Ser Arg  
 500 505 510

Ala Gln Ser Ser Pro Ala Ser Ala Thr Phe Pro Val Ser Val Gln Glu  
 515 520 525  
 Pro Pro Thr Lys Pro Arg Phe Thr Thr Gly Leu Val Tyr Asp Thr Leu  
 530 535 540  
 Met Leu Lys His Gln Cys Thr Cys Gly Ser Ser Ser Ser His Pro Glu  
 545 550 555 560  
 His Ala Gly Arg Ile Gln Ser Ile Trp Ser Arg Leu Gln Glu Thr Gly  
 565 570 575  
 Leu Arg Gly Lys Cys Glu Cys Ile Arg Gly Arg Lys Ala Thr Leu Glu  
 580 585 590  
 Glu Leu Gln Thr Val His Ser Glu Ala His Thr Leu Leu Tyr Gly Thr  
 595 600 605  
 Asn Pro Leu Asn Arg Gln Lys Leu Asp Ser Lys Lys Leu Leu Gly Ser  
 610 615 620  
 Leu Ala Ser Val Phe Val Arg Leu Pro Cys Gly Gly Val Gly Val Asp  
 625 630 635 640  
 Ser Asp Thr Ile Trp Asn Glu Val His Ser Ala Gly Ala Ala Arg Leu  
 645 650 655  
 Ala Val Gly Cys Val Val Glu Leu Val Phe Lys Val Ala Thr Gly Glu  
 660 665 670  
 Leu Lys Asn Gly Phe Ala Val Val Arg Pro Pro Gly His His Ala Glu  
 675 680 685  
 Glu Ser Thr Pro Met Gly Phe Cys Tyr Phe Asn Ser Val Ala Val Ala  
 690 695 700  
 Ala Lys Leu Leu Gln Gln Arg Leu Ser Val Ser Lys Ile Leu Ile Val  
 705 710 715 720  
 Asp Trp Asp Val His His Gly Asn Gly Thr Gln Gln Ala Phe Tyr Ser  
 725 730 735  
 Asp Pro Ser Val Leu Tyr Met Ser Leu His Arg Tyr Asp Asp Gly Asn  
 740 745 750  
 Phe Phe Pro Gly Ser Gly Ala Pro Asp Glu Val Gly Thr Gly Pro Gly  
 755 760 765  
 Val Gly Phe Asn Val Asn Met Ala Phe Thr Gly Gly Leu Asp Pro Pro  
 770 775 780  
 Met Gly Asp Ala Glu Tyr Leu Ala Ala Phe Arg Thr Val Val Met Pro  
 785 790 795 800  
 Ile Ala Ser Glu Phe Ala Pro Asp Val Val Leu Val Ser Ser Gly Phe  
 805 810 815

Asp Ala Val Glu Gly His Pro Thr Pro Leu Gly Gly Tyr Asn Leu Ser  
 820 825 830  
 Ala Arg Cys Phe Gly Tyr Leu Thr Lys Gln Leu Met Gly Leu Ala Gly  
 835 840 845  
 Gly Arg Ile Val Leu Ala Leu Glu Gly Gly His Asp Leu Thr Ala Ile  
 850 855 860  
 Cys Asp Ala Ser Glu Ala Cys Val Ser Ala Leu Leu Gly Asn Glu Leu  
 865 870 875  
 Asp Pro Leu Pro Glu Lys Val Leu Gln Gln Arg Pro Asn Ala Asn Ala  
 885 890 895  
 Val Arg Ser Met Glu Lys Val Met Glu Ile His Ser Lys Tyr Trp Arg  
 900 905 910  
 Cys Leu Gln Arg Thr Thr Ser Thr Ala Gly Arg Ser Leu Ile Glu Ala  
 915 920 925  
 Gln Thr Cys Glu Asn Glu Glu Ala Glu Thr Val Thr Ala Met Ala Ser  
 930 935 940  
 Leu Ser Val Gly Val Lys Pro Ala Glu Lys Arg Pro Asp Glu Glu Pro  
 945 950 955 960  
 Met Glu Glu Glu Pro Pro Leu  
 965

<210> 31  
 <211> 8459  
 <212> DNA  
 <213> Homo sapiens

<400> 31  
 ggaggttggtg gggccgcccgc cgcggagcac cgtccccgcc gccgcccagag cccgagcccgc 60  
 agccccgcga cccgcccgcg ccgcccgcgc cgcgcccga acagcctccc agcctgggcc 120  
 cccggcgccg cgtggccgc gtcccggtg tcgcccgcgc agcccgagcc cgcgcccgcg 180  
 cgggtggcgg cgcaggtga ggagatgcgg cgcggagcgc cggagcaggg ctagagccgc 240  
 ccgcccgcgc ccgcccgcgt aagcgcagcc ccggcccggc gcccgcgggc cattgtccgc 300  
 cgcccgcgc gcgcccgcg cagcctgcag gccttgagc ccgcccagc tggacgcgc 360  
 cggttccacac ccgcccgcg cgcggccgtg ggaggcgggg gccagcgtg gccgcccgc 420  
 gtgggaccgc ccggtcccca gggccgcccgc gcccttctg gacctttcca cccgcccgc 480  
 gaggcggctt cgcgcgcgg ggcggggggc cgggggtggg cacggcaggc agcggcgcgc 540  
 tctcccggtg cggggccgc gcccccgag caggttcatc tgcagaagcc agcggacgc 600  
 tctgttcaac ttgtgggtta cctgggtcat gagaccttgc cggcgaggct cggcgcttga 660  
 acgtctgtga ccagccctc accgtcccgc tacttgtatg tgttggtggg agtttgagc 720  
 tcgttgagc tctgtttcc gtggaaattt tgagccattt cgaatcactt aaaggagtgg 780  
 acattgctag caatgagctc ccaaagccat cacatggac tttctggccg agaccagcca 840  
 gtggagctgc tgaatcctgc ccgctgaac cacatgccc gcacgggtga tgtggccacg 900  
 gcgctgcctc tgcaagtggc cccctcgga gtgcccag acctgcgcct ggaccaccag 960  
 ttctcactgc ctgtggcaga gccggccctg cgggagcagc agctgcagca ggagctcctg 1020  
 gcgctcaagc agaagcagca gatccagagg cagatcctca tcgctgagtt ccagaggcag 1080  
 cagagcagc tctcccgga gcacgagggc cagctccaag agcacatcaa gcaataacag 1140  
 gagatgctgg ccatgaagca ccagcaggag ctgctggaac accagcgga gctggagagg 1200

caccgccagg agcaggagct ggagaagcag caccgggagc agaagctgca gcagctcaag 1260  
aacaaggaga agggcaaaga gaggccgctg gccagcacag aagtgaagat gaagttacaa 1320  
gaatttgtcc tcaataaaaa gaaggcgctg gccaccggga atctgaacca ctgcatttcc 1380  
agcgaccctc gctactggta cgggaaaacg cagcacagtt cccttgacca gaggttctcca 1440  
ccccagagcg gagggtcgac ctctataac caccgggtcc tgggaatgta cgacgcaaa 1500  
gatgacttcc ctcttaggaa aacagcttct gaaccgaatc tgaaattacg gtccaggcta 1560  
aagcagaag tggccgaaag acggagcagc cccctgttac gcaggaaaga cgggccagtg 1620  
gtcactgctc taaaaaagcg tccgttggat gtcacagact ccgctgagc cagcgcccca 1680  
ggctccggac ccagctcacc caacaacagc tccgggagcg tcagcgcgga gaacggatatc 1740  
gcgcccgccg tccccagcat cccggcgag acgagtttg cgcacagact tgtggcacga 1800  
gaaggtcgg ccgctccact tccccctac acatcgccat ccttgcccaa catcacgctg 1860  
ggcctgcctg ccaccggccc ctctgcgggc acggcgggcc agcaggacac cgagagactc 1920  
acccttccc cctccagca gaggctctcc ctttccccg gcaccacct cactccctac 1980  
ctgagcacct cgcccttggg ggggacgagc ggggacgagc acagccctct tctgcagcac 2040  
atggtcttac tggagcagcc accggcaca gcacccctcg tcacaggcct gggagcactg 2100  
ccccccacg cacagtcctt ggttgggtgca gaccgggtgt cccctccat ccacaagctg 2160  
cggcagcacc gcccactggg ggggacccag tgggccccg tgccccagaa cgcccaggct 2220  
ctgcagcacc tggatcatcca gcagcagcat cagcagtttc tggagaaaca caagcagcag 2280  
ttccagcagc agcaactgca gatgaacaag atcatcccc agccaagcga gccagcccg 2340  
cagccggaga gccaccggga ggagacggag gaggagctcc gtgagcaca ggctctgctg 2400  
gacgagccct acctggaccg gctgccgggg cagaaggagg cgcacgcaca ggccggcgctg 2460  
caggtgaagc agggagccat tgagagcgat gaggagagg cagagcccc acgggaggtg 2520  
gagccggggc agcgccagcc cagtgcagc gagctgctct tcagacagca agccctctg 2580  
ctggagcagc agcgcatcca ccagctgagg aactaccagg cgtccatgga ggccgcccgc 2640  
atccccgtgt ccttcggcgg ccacaggcct ctgtcccggg cgagtcctc acccgctct 2700  
gccaccttcc cgtgtgtgt gcaggagccc cccaccaagc cgaggttcac gacaggcctc 2760  
gtgtatgaca cgtgatgtt gaagcaccag tgacactgag ggagtagcag cagccacccc 2820  
gagcacgccc ggaggatcca gagcatctgg tcccgctgc agggagcggg cctccggggc 2880  
aaatgcaggt gcatcccgcg acgcaaggcc acctggagg agctacagac ggtgactcg 2940  
gaagccca cctcctgtg tggcacgaac cccctcaac ggcagaaact ggacagtaag 3000  
aaacttctag gctcgctgc ctccgtgttc gtccggctcc cttgcggtgg tgttgggggtg 3060  
gacagtga ccatatggaa cgaggtgcac tggcggggg cagcccgctt ggctgtgggc 3120  
tgctgtgtag agctggtct caaggtggcc acaggggagc tgaagaatgg ctttgcgtg 3180  
gtccgcccc ctggacacca tgcggaggag agcacgcca tgggctttt ctacttcaac 3240  
tccgtggccg tggcagccaa gcttctgcag cagaggttga gcgtgagcaa gatcctcctc 3300  
gtggactggg acgtgcacca tggaaacggg acccagcagg ctttctacag cgaccctagc 3360  
gtcctgtaca tgtccctcca ccgctacgac gatgggaact tcttcccagg cagcggggct 3420  
cctgatgagg tgggcacagg gcccggcgct gggttcaacg tcaacatggc tttcaccggc 3480  
ggcctggacc ccccatggg agacgctgag tacttggcg ccttcagaac ggtggctatg 3540  
ccgatcgcca gcgagtttg cccggatgtg gtgctggtgt catcaggctt cgatgccgtg 3600  
gagggccacc ccacccctct tgggggctac aacctctccg ccagatgctt cgggtacctg 3660  
acgaagcagc tgatgggctt ggctggcgcc cggattgtcc tggccctcga gggaggccac 3720  
gacctgaccg ccatttgcga cgctcgga gcagtggtt ctgccttctt gggaaacgag 3780  
cttgatcctc tcccagaaaa gggtttacag caaagaccca atgcaaacgc tgtccgttcc 3840  
atggagaaag tcatggagat ccacagcaag tactggcgct gcctgcagcg cacaacctcc 3900  
acagcggggc gttctctgat cgaggctcag acttgcgaga acgaagaagc cgagacggtc 3960  
accgccatgg cctcgctgtc cgtgggctg tccctcgaag ctgctgttct cttgtctgtc 4020  
cccatggaag aggagccgct cctgtagcac gccaagaaac tttccgctgt cacgcctgcg tcccaccgtg 4140  
tgtctctgtc ttgaagctca gggacaccca gcgtgcaaca gccacgggaa gcctttctgc 4200  
gggctctctt ggagcaccga gagacgcaca tgcacgcctg ggcgtggcag cctcacaggg 4260  
cgcccaggcc cacaggtctc gagcgcaga cacacggaca cgcggaagcc aagcacactc 4320  
aacacgggac agacgcgggc gccgtggaag aaaggagcct gtggcaacag gcggccgagc 4380  
tggcggttcc cgcaagggac gcttaaagtt tattaccac aactccacag tctctgtgta 4440  
caaacttgat taaaactggt agcttatttt ttttttaaag agggagcttt ctacggctgt 4500  
aaccactcga ctcatcttgt agcgtgtgct ggcggggggc ctgcacccgg gtgggggaca 4620  
ggcccgcctc tgtgaacat agcgtgtgct ggcggggggc



gagggacctt taaagaaaac aaaactggac agaaacagga atgtgagctg ggggagctgg 4680  
 cttgagtttc tcaaaagcca tcggaagatg cgagtttgtg cctttttttt tattgctctg 4740  
 gtggattttt gtggctgggt tttctgaagt ctgaggaaca atgccttaag aaaaaacaaa 4800  
 cagcaggaat cgggtgggaca gtttctgtg gccagccgag cctggcagtg ctggcaccgc 4860  
 gagctggcct gacgcctcaa gcacgggcac cagccgtcat ctccggggcc aggggctgca 4920  
 gcccgcggt cctgtttttg ctttattgtt gtttaagaaa aatggaggtg gttccaaaaa 4980  
 agtggcaaat ccggttgag gttttgaagt ccaacaaatt ttaaacgaat ccaaagtgtt 5040  
 ctacacgtc acatacgatt gagcatctcc atctggctgt gaagcatgtg gtaggcacac 5100  
 ttgacagtgt acgatcgga tgctttttat taaaagcaag tagcatgaag tattgcttaa 5160  
 attttaggta taaataaata tatatatgta taatatatat tccaatgtat tccaagctaa 5220  
 gaaacttact tgattcttat gaaatcttga taaaatattt ataatgcatt tatagaaaaa 5280  
 gtatatatat atatataaaa tgaatgcaga ttgcaaggt ccctgcaaat ggatggcttg 5340  
 tgaatttgct ctcaaggtgc ttatggaaag ggatcctgat tgattgaaat tcatgttttc 5400  
 tcaagctcca gattggctag atttcagatc gccaacacat tcgccactgg gcaactaccc 5460  
 tacaagtttg tactttcatt ttaattattt tctaacagaa ccgctccgt ctccaagcct 5520  
 tcatgcacat atgtacctaa tgagttttta tagcaaagaa tataaatttg ctgttgattt 5580  
 ttgtatgaat tttttcacia aaagatcctg aataagcatt gttttatgaa ttttacattt 5640  
 ttctcaccac tttagcaatt ttctgaatgg taataatgtc taaatctttt tcctttctga 5700  
 attcttgctt gtacattttt ttttacctt caaaggtttt taattatttt tgtttttatt 5760  
 tttgtacgat gagttttctg cagcgtacag aattgttgct gtcagattct attttcagaa 5820  
 agtgagagga gggaccgtag gtcttttcgg agtgacacca acgattgtgt ctttctgggt 5880  
 ctgtcctagg agctgtataa agaagcccag gggctctttt taactttcaa cactagtagt 5940  
 attacgaggg gtggtgtgtt tttccctcc gtggcaaggg cagggagggg tgcttaggat 6000  
 gcccgccac cctgggaggg ttgccagatg ccgggggcag tcagcattaa tgaaactcat 6060  
 gtttaaacct ctctgaccac atcgtcagga tagaattcta acttgagttt tccaaagacc 6120  
 ttttgagcat gtcagcaatg catggggcac acgtggggct ctttaccac ttgggttttt 6180  
 ccactgcagc cactggcca gccctggatt ttggagcctg tggctgcaag gaaccaggg 6240  
 acccttggtt cctggtgaac ctgcagggag ggtatgattg cctgaccagg acagccagtc 6300  
 tttactcttt ttctcttcaa cagtaactga cagtcacgtt ttactggtaa cttattttcc 6360  
 agcacatgaa gccaccagt ttcttccaaa gtgtatattg ggttcagact tgggggcaga 6420  
 agttcagaca caccgtgctc aggagggacc cagagccgag ttctggagtt tggtaaagt 6480  
 tacagggtag cttctgaaat taactcaaac ttttgaccaa atgagtgcag attccttgat 6540  
 tcaactggtc actgggctgc tgatggtcag ctctgagaca gtggtttgag agcaggcaga 6600  
 acggctcttg gacttgtttg actttccct ccctgggtgc cactctttgc tctgaagccc 6660  
 agattggcaa gaggagctgg tccattcccc attcatggca cagagcagtg gcagggccca 6720  
 gctagcaggc tcttctggcc tcttggcct cactctctgc atagecctct ggggatcctg 6780  
 ccacctgccc tcttaccctg ccgtggctta tggggaggaa tgcatcatct cacttttttt 6840  
 ttttaagcag atgatgggt aacatggact gctcagtgcc cagggttatca gtggggggac 6900  
 ttaattctaa tctcattcaa atggagacgc cctctgcaaa ggcctggcag ggggaggcac 6960  
 gtttcatctg tcagctcact ccagcttcac aaatgtgctg agagcattac tgtgtagcct 7020  
 tttctttgaa gacacactcg gctcttctcc acagcaagcg tccagggcag atggcagagg 7080  
 atctgcctcg gcgtctgcag gggggaccac gtcagggagg gttccttcat gtgttctccc 7140  
 tgtgggtcct tggaccttta gcctttttct tcttttgcaa aggccttggg ggcactggct 7200  
 gggagtcagc aagcgagcac tttatatccc tttgaggaa accctgatga cgccactggg 7260  
 cctcttggcg tctgccctgc cctcgcggt tcccgcctg ccgcagcgtg ccacagtgcc 7320  
 cagccccac cagcaggcgg ctgtcccga ggccgtggcc cgctgggact ggccgcccct 7380  
 ccccgagctc ccagggtctt ggttctggag ggccactttg tcaaggtgtt tcagtttttc 7440  
 tttacttctt ttgaaaatct gtttgcaagg ggaaggacca tttcgtaatg gtctgacaca 7500  
 aaagcaagtt tgatttttgc agcactagca atggactttg ttgtttttct ttttgatcag 7560  
 aacattcctt ctttactggg cacagccag gcattgatac atatatataa atatagatat aaatatatat 7680  
 tgggcccacg tgttttatgg gattgatac gaggttgcag ggactgtacg accggcatga 7740  
 gaatatattt ttttaagttt cctacacctg aggttgcag aactcggcag ctttggggaa gaagaaaaat 7800  
 ctttatattg tatacagatt ttgcacgcca agatcaaaaa gatggaaatt tttctgtaaa 7860  
 gcctttctgt tccccctca tgacatttgc agtttgcgct ttattgaact tattcttaag 7920  
 acaaaacctt gaaggagagg agggcgggga agtttgactac ttaaaccatt gtcataattaa 7980  
 aaattgtact ttttattgta agaaaaataa accaataata gagttttatt tatttatgtg 8040  
 gaaaaaaagt ttatctagca cttgtgacat

gaaacagtgt tttagggaaa ctactcagaa ttcacagtga actgcctgtc tctctcgagt 8100  
 tgatttggag gaattttgtt ttgttttgtt ttgtttgtt ccttttatct ccttccacgg 8160  
 gccaggcgag cgccgcccgc cctcactggc cttgtgacgg tttattctga ttgagaactg 8220  
 ggcggactcg aaagagtccc cttttccgca cagctgtgtt gactttttaa ttacttttag 8280  
 gtgatgtatg gctaagattt cactttaagc agtcgtgaac tgtgcgagca ctgtggttta 8340  
 caattaract ttgcacgaa aggaaacat tttcttattg taacgaagct gagcgtgttc 8400  
 ttagctcggc ctcactttgt ctctggcatt gattaaaagt ctgctattga aagaaaaag 8459

<210> 32

<211> 716

<212> PRT

<213> Homo sapiens

<400> 32

Leu Arg Gln Gly Gly Thr Leu Thr Gly Lys Phe Met Ser Thr Ser Ser  
 1 5 10 15

Ile Pro Gly Cys Leu Leu Gly Val Ala Leu Glu Gly Asp Gly Ser Pro  
 20 25 30

His Gly His Ala Ser Leu Leu Gln His Val Leu Leu Leu Glu Gln Ala  
 35 40 45

Arg Gln Gln Ser Thr Leu Ile Ala Val Pro Leu His Gly Gln Ser Pro  
 50 55 60

Leu Val Thr Gly Glu Arg Val Ala Thr Ser Met Arg Thr Val Gly Lys  
 65 70 75 80

Leu Pro Arg His Arg Pro Leu Ser Arg Thr Gln Ser Ser Pro Leu Pro  
 85 90 95

Gln Ser Pro Gln Ala Leu Gln Gln Leu Val Met Gln Gln Gln His Gln  
 100 105 110

Gln Phe Leu Glu Lys Gln Lys Gln Gln Gln Leu Gln Leu Gly Lys Ile  
 115 120 125

Leu Thr Lys Thr Gly Glu Leu Pro Arg Gln Pro Thr Thr His Pro Glu  
 130 135 140

Glu Thr Glu Glu Glu Leu Thr Glu Gln Gln Glu Val Leu Leu Gly Glu  
 145 150 155 160

Gly Ala Leu Thr Met Pro Arg Glu Gly Ser Thr Glu Ser Glu Ser Thr  
 165 170 175

Gln Glu Asp Leu Glu Glu Glu Asp Glu Glu Glu Asp Gly Glu Glu Glu  
 180 185 190

Glu Asp Cys Ile Gln Val Lys Asp Glu Glu Gly Glu Ser Gly Ala Glu  
 195 200 205

Glu Gly Pro Asp Leu Glu Glu Pro Gly Ala Gly Tyr Lys Lys Leu Phe  
 210 215 220

Ser Asp Ala Gln Pro Leu Gln Pro Leu Gln Val Tyr Gln Ala Pro Leu  
 225 230 235 240  
 Ser Leu Ala Thr Val Pro His Gln Ala Leu Gly Arg Thr Gln Ser Ser  
 245 250 255  
 Pro Ala Ala Pro Gly Gly Met Lys Ser Pro Pro Asp Gln Pro Val Lys  
 260 265 270  
 His Leu Phe Thr Thr Gly Val Val Tyr Asp Thr Phe Met Leu Lys His  
 275 280 285  
 Gln Cys Met Cys Gly Asn Thr His Val His Pro Glu His Ala Gly Arg  
 290 295 300  
 Ile Gln Ser Ile Trp Ser Arg Leu Gln Glu Thr Gly Leu Leu Ser Lys  
 305 310 315 320  
 Cys Glu Arg Ile Arg Gly Arg Lys Ala Thr Leu Asp Glu Ile Gln Thr  
 325 330 335  
 Val His Ser Glu Tyr His Thr Leu Leu Tyr Gly Thr Ser Pro Leu Asn  
 340 345 350  
 Arg Gln Lys Leu Asp Ser Lys Lys Leu Leu Gly Pro Ile Ser Gln Lys  
 355 360 365  
 Met Tyr Ala Val Leu Pro Cys Gly Gly Ile Gly Val Asp Ser Asp Thr  
 370 375 380  
 Val Trp Asn Glu Met His Ser Ser Ser Ala Val Arg Met Ala Val Gly  
 385 390 395 400  
 Cys Leu Leu Glu Leu Ala Phe Lys Val Ala Ala Gly Glu Leu Lys Asn  
 405 410 415  
 Gly Phe Ala Ile Ile Arg Pro Pro Gly His His Ala Glu Glu Ser Thr  
 420 425 430  
 Ala Met Gly Phe Cys Phe Phe Asn Ser Val Ala Ile Thr Ala Lys Leu  
 435 440 445  
 Leu Gln Gln Lys Leu Asn Val Gly Lys Val Leu Ile Val Asp Trp Asp  
 450 455 460  
 Ile His His Gly Asn Gly Thr Gln Gln Ala Phe Tyr Asn Asp Pro Ser  
 465 470 475 480  
 Val Leu Tyr Ile Ser Leu His Arg Tyr Asp Asn Gly Asn Phe Phe Pro  
 485 490 495  
 Gly Ser Gly Ala Pro Glu Glu Val Gly Gly Gly Pro Gly Val Gly Tyr  
 500 505 510  
 Asn Val Asn Val Ala Trp Thr Gly Gly Val Asp Pro Pro Ile Gly Asp  
 515 520 525

Val Glu Tyr Leu Thr Ala Phe Arg Thr Val Val Met Pro Ile Ala His  
 530 535 540  
 Glu Phe Ser Pro Asp Val Val Leu Val Ser Ala Gly Phe Asp Ala Val  
 545 550 555 560  
 Glu Gly His Leu Ser Pro Leu Gly Gly Tyr Ser Val Thr Ala Arg Cys  
 565 570 575  
 Phe Gly His Leu Thr Arg Gln Leu Met Thr Leu Ala Gly Gly Arg Val  
 580 585 590  
 Val Leu Ala Leu Glu Gly Gly His Asp Leu Thr Ala Ile Cys Asp Ala  
 595 600 605  
 Ser Glu Ala Cys Val Ser Ala Leu Leu Ser Val Glu Leu Gln Pro Leu  
 610 615 620  
 Asp Glu Ala Val Leu Gln Gln Lys Pro Asn Ile Asn Ala Val Ala Thr  
 625 630 635 640  
 Leu Glu Lys Val Ile Glu Ile Gln Ser Lys His Trp Ser Cys Val Gln  
 645 650 655  
 Lys Phe Ala Ala Gly Leu Gly Arg Ser Leu Arg Glu Ala Gln Ala Gly  
 660 665 670  
 Glu Thr Glu Glu Ala Glu Thr Val Ser Ala Met Ala Leu Leu Ser Val  
 675 680 685  
 Gly Ala Glu Gln Ala Gln Ala Ala Ala Ala Arg Glu His Ser Pro Arg  
 690 695 700  
 Pro Ala Glu Glu Pro Met Glu Gln Glu Pro Ala Leu  
 705 710 715

&lt;210&gt; 33

&lt;211&gt; 2233

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 33

ccctgctggc ggggtggcag ctgaccggca agttcatgag cacatcctct attcctggct 60  
 gectgctggg cgtggcactg gagggcgacg ggagcccca cgggcatgcc tccctgctgc 120  
 agcatgtgct gttgctggag caggcccggc agcagagcac cctcattgct gtgccactcc 180  
 acgggcagtc cccactagtg acgggtgaac gtgtggccac cagcatgcgg acggtaggca 240  
 agtcccgcg gcacggcccc ctgagccgca ctacgtctc accgctgccg cagagtcccc 300  
 aggcctgca gcagctggtc atgcaacaac agcaccagca gttcctggag aagcagaagc 360  
 agcagcagct acagctgggc aagatcctca ccaagacagg ggagctgcc aggagccca 420  
 ccaccacccc tgaggagaca gaggaggagc tgacggagca gcaggaggtc ttgctggggg 480  
 agggagccct gaccatgccc cgggagggct ccacagagag tgagagcaca cagggaagacc 540  
 tggaggagga ggacgaggaa gaggatgggg agggaggagga ggattgcatc cagggttaagg 600  
 acgaggaggg cgagagtggg gctgaggagg ggcccagctt ggaggagcct ggtgctggat 660  
 acaaaaaact gttctcagat gccagccgc tgcagccttt gcagggtgtac caggcgcccc 720  
 tcagcctggc cactgtgccc caccaggccc tgggcccgtac ccagtcctcc cctgctgccc 780  
 ctgggggcat gaagagcccc ccagaccagc ccgtcaagca cctcttcacc acagggtgtgg 840

```

tctacgacac gttcatgcta aagcaccagt gcatgtgcgg gaacacacac gtgcaccctg 900
agcatgctgg cgggatccag agcatctggt cccggctgca ggagacaggc ctgcttagca 960
agtgcgagcg gatccgaggt cgcaaagcca cgctagatga gatccagaca gtgcactctg 1020
aataccacac cctgctctat gggaccagtc cctcaaccg gcagaagcta gacagcaaga 1080
agttgctcgg ccccatcagc cagaagatgt atgctgtgct gccttgtggg ggcacggggg 1140
tggacagatga caccgtgtgg aatgagatgc actcctccag tgctgtgcgc atggcagtg 1200
gctgcctgct ggagctggcc ttcaaggtgg ctgcaggaga gctcaagaat ggatttgcca 1260
tcatccggcc cccaggacac cagcccgagg aatccacagc catgggattc tgcttcttca 1320
actctgtagc catcaccgca aaactcctac agcagaagtt gaacgtgggc aaggctctca 1380
tcgtggactg ggacattcac catggcaatg gcaccagca ggcgttctat aatgacctct 1440
ctgtgctcta catctctctg catcgctatg acaacgggaa cttctttcca ggctctgggg 1500
ctcctgaaga ggttgggtgga ggaccaggcg tggggtacaa tgtgaacgtg gcatggacag 1560
gaggtgtgga cccccatt ggagacgtgg agtaccttac agccttcagg acagtgtgga 1620
tgccattgac ccacgagttc tcacctgatg tggctctagt ctccgcccggg tttgatgctg 1680
ttgaaggaca tctgtctcct ctgggtggct actctgtcac cgccagatgt tttggccact 1740
tgaccaggca gctgatgacc ctggcagggg gccgggtggt gctggccctg gagggaggcc 1800
atgacttgac cgccatctgt gatgcctctg aggccttgtg ctccgctctg ctcatgttag 1860
agctgcagcc cttggatgag gcagtccttc agcaaaagcc caacatcaac gcagtggcca 1920
cgctagagaa agtcatcgag atccagagca aacactggag ctgtgtgcag aagttcgccg 1980
ctggtctggg ccggtccctg cgagaggccc aagcaggtga gaccgaggag gccgagactg 2040
tgagcgccat ggccttctg tgggtggggg ccgagcaggg ccaggctgcg gcagcccggg 2100
aacacagccc caggccggca gaggagccca tggagcagga gcctgccctg tgacgccccg 2160
gccccatcc ctctgggctt caccattgtg attttgttta tttttctat taaaaacaaa 2220
aagtcacaca ttc 2233

```

&lt;210&gt; 34

&lt;211&gt; 112

&lt;212&gt; PRT

&lt;213&gt; Homo sapiens

&lt;400&gt; 34

```

Thr Ile Val Lys Pro Val Ala Lys Glu Phe Asp Pro Asp Met Val Leu
 1             5             10             15
Val Ser Ala Gly Phe Asp Ala Leu Glu Gly His Thr Pro Pro Leu Gly
          20          25          30
Gly Tyr Lys Val Thr Ala Lys Cys Phe Gly His Leu Thr Lys Gln Leu
          35          40          45
Met Thr Leu Ala Asp Gly Arg Val Val Leu Ala Leu Glu Gly Gly His
          50          55          60
Asp Leu Thr Ala Ile Cys Asp Ala Ser Glu Ala Cys Val Asn Ala Leu
          65          70          75          80
Leu Gly Asn Glu Leu Glu Pro Leu Ala Glu Asp Ile Leu His Gln Ser
          85          90          95
Pro Asn Met Asn Ala Val Ile Ser Leu Gln Lys Ile Ile Glu Ile Gln
          100          105          110

```

<210> 35  
<211> 80331  
<212> DNA  
<213> Homo sapiens

<400> 35  
ttaaagacat actttgaatt tcaatgatct tctgtaaaga aataacagca ttcattattcg 60  
ggctttgggtg gagaatatct tctgcaagtg gctccagctg caagaatagt agataatagt 120  
atgagcagaa tattatgact ttatagtaag tctcacagaa gcaaagcaaa ctgaaacaac 180  
ctaactcctca ggaaaagcct gctccgagaa ctagttaaca ttttgctgat attagttcta 240  
gaagtgtagc cagttttatt ttctgttttg tatccatgta attgaattcc aaggggcttt 300  
tccattgggtc acaagactaa tctatgaagt ccctgaagca ggtgcatgtc tgtgcattat 360  
tcattaaaaa tctgagttat ttgtgtaatt tttgtagggt cctgacaaac caaattccat 420  
catgtctgta tatgcagctg ggcctgcaa acaaaacctc agggaaagtg caatagacag 480  
aaagtgggca ctctattatc cactactttca cagtgttttt acatccaacc acctatatac 540  
tttgaacact tcacgataga aagccatgag acacagctgc ttttattcaa aggccattga 600  
ataaagtagt agagaaaggg ttcaaataac caaatgtaaa ataactgtac agtttcattt 660  
aacttctact ttattcataa ctatgcagat gtctgtgtgt aagcacaggc caaactccta 720  
ccttgcaaat ctatcataat cttctggaat tacactaatt tttcatggag aagctcagca 780  
agcattgctt tgcaagaaat gaagagaagc tttaaataat ttacagagcc tatctgttag 840  
gcctaagtct gataacacat ccctcagaat gctgtgggtg ttagtttggc atgttgacgc 900  
agaaagcgca tggctagggc ccttgcaaat aaaatagtgt tccagctatt gtgacccaaa 960  
aagcaataa agtaatagta acaaaaggat taacaaaaaa gtagttttcc tagaaacatt 1020  
aaggttaate atctcaaata agaactgggt atcaaaactat aatatggcac gaatgggaag 1080  
cgatgtcact agacgcacat aagcatgaac tcatctatgt ctcttcatct gtaggaaaac 1140  
ctaaaaaac acagggatta ccagtttcca ccacatatgt gagtgaatct tcccccagg 1200  
gtccctctga attgattatt ctattcttca atcatgaaat ctacaacaat agcaccttta 1260  
ttccagatgc cacaggataa cagactagct cagggatatt taccacaggg taaattcact 1320  
aactataact ttccagagtg tttttcttag ctgcccaga aaaactttta aacatcaaaa 1380  
ggtttatttg caatacagtt tgggtgagagg aaaaaaaaaa aaaaacatca ccaccaccgc 1440  
tctgtggcag tacaagggtc tgaaataaac tcttaaaact tgttaaaac atttttttaa 1500  
atgtgggtatt tcaaatgtga tcttcaagaa tatgttagtc tagtaacact ctcttaactc 1560  
agaggaacta ctgaatcata aactgaagct tacttggaaa actcttatgc attagacaag 1620  
gttcagaggg ctactttgct tataaataat ttttctactc tttcttggag cttagagaaa 1680  
ataattttta atagaaatca ggtagatttt actaataaaa tatcttgaaa tgacactcta 1740  
tgttccaata tttaagaaca aaagcacaaa gcgatgacag cttatttagc tcttcaaaaa 1800  
gcttccctgt gactttgggt taaaaatcct gacaaaactga aaggtgctgg ctccctggaaa 1860  
gaaagctata ggcagatcat atatgtaaaa catctaactt ctggtctctt gcacactgag 1920  
gtctgggcta ttttaagac tcagggtata cagaagcat acgtgattca gagtattgag 1980  
agtaaaatac aaacaccctt aaacccccaa tttagaatct tcagttagat gcaaaagggt 2040  
tgtgtctatt ttaaaaagca attcagagaa ttaaggcaat taaattgac atttaaacct 2100  
cccaaaccat ttccctgcat gttttagttg aatgtcattt agaggattta accttcagta 2160  
aattgcccc aattgtttca ttttgagtgt atacatacag acagagctga attcagaaat 2220  
ttctcaatgt aggttcttta tttttctctt ggcaggtagt caatggataa tattctctcc 2280  
gttggaaga aggcaagtgg catttagagt ctgtttttat aaaattaaaa tcttgtagtg 2340  
cgggaccaca gaactggatt gtcttttcta gacatttatt taatcactca caattatagg 2400  
cactaacaac atctgattga agcatccact taataaatat ttatgagtgt tgtcattatt 2460  
cataatttaa taactaataa aataatatta aatattcatt ttttataaat ttggagcaga 2520  
aaataagaat atgtggtaaa gttttgctat gtattttaatt taggtgatta gatacagcaa 2580  
aaacattggt gatggagatt aatcagcatt actggaaatt attaaaagat aaataaggag 2640  
taatttatac aaacaagaca acttttgcac gcaaaagtta cagaaagatg aagcagatgc 2700  
aaatgtagga aatagtacac acccgtcatg ccatttctgt caagcaattc tgttaataaa 2760  
tggttaattat catggagtta taagatacac tagataattt taacacaacc tcttgacact 2820  
taaagctctc atccagctta attgtatcta aagcttaatc acaagcatta ctcatagcaa 2880  
ttctttacac agattttcag gctcagtgac agggaaattt attttctac atcattttca 2940  
gaaagttgtg ataattgatt ggcattgatt agatgtttgt taagttgcat ataccatata 3000  
cattctaagt actgcagcta ttttaaaaca ccataaaatt gtggccatta tcatcttata 3060

```

agtaatttcc aggttcttta gaatcagatc atttaaactg tcaaaaatca ttttagttgc 3120
ctaagattca tctatagaaa gaggcgaggg atattcttgg agaagctgtt gagtaagatt 3180
tttaaaattt acgctgtact gatgagctat gaaaaacagc tcaactgattt tttttatttg 3240
catgacttag aacagaacat aaaagaagct aaacagagcc tttgcaaatg taacagggtgt 3300
gtgaggatgg atgtatacat caatcaagca aaggatctat taaatagact tgttagcggt 3360
tttgttatgt gttgacgttt cccaaatatg ccaagtattt taatatttct gtacttttat 3420
ctattctgtt tctcttgaat tctatttttt tcatcttctt ttgaattggg aaaaccttac 3480
caagcattca aggaccaccg caaatattgc gtgctcctca aattctccac tagagcaaat 3540
ttcttcccc cctatggccc tttccccac aaatattctt atttactaaa tacattatgt 3600
agtagaaagt cttttttatc ccactctcta ttttgttgtg agccatttaa agacgaagat 3660
ggagactga tatgaaagac attttaaaaa tgttgaataa atggagaaat acttaatcga 3720
aaaaataaca tgaagagggtg gcctttatct tgcctaccat agctaacaag acaaaaataa 3780
atgggttctt cctcttgggt tctgtctgta atcaggatat ggttttaaga tgaagaatta 3840
gaacagcagt gataactcat tttgttttct aagggtgaact gctcttgcac aatttccaca 3900
caattatttt ctctatgca ttggcaaggt tctctgacat gcaggcagat atttctatag 3960
atcagaaatg cagggaaatg caaaagaaac aaagaccag ggcaagtaga ggcagaatgg 4020
ccatgccaat aattagagga gaaaagggtg tctccaattg agcggaagaa aaagcaatag 4080
aatgacaata aaatggaatg aaattttgaa aggcattgaa attaatcttt aatccaattt 4140
gaggagaact gggatcatct caatacctag acctctaate catacataa tgtattctat 4200
aatttattta gatgtttgtt aacttctcta aaaatattct acaattttat gaataggggtc 4260
atattttcag atagatttat tctaggtatt tggtttgttt aatgcttttg taaattatgt 4320
atgtgtatat atttacacta tatatataaa atacgtatat ttataattta attaaaaaat 4380
tttcaatcct ggtgtgatct tgcctgtgtt gtttgttctc tggagtagga gtcattttat 4440
tccattcgcc ttctctccca ccacagtggg tgcacaaaac ccatagaaga tttgatggac 4500
gtggacatga gccctctaag gctcaaaat taacttttta attgtgaact aaagctgaca 4560
aatattatca ctttaatgtg gatgatgatg aaaatgagca ccagttttct ttaagaatgg 4620
ccagttcagg agctggtacc tatgatgaat tgcacatcgt tgaagcagaa gcaatgaaat 4680
ataaacgcag tccaaataaa agtaacactg gcaactttga aaatgtctgt acagccaaca 4740
gtttcccttg tgggctttga aataccacca cctatgggtc tatggttgaa gcatagttca 4800
gggccagtg atattaatgg gcagcactta acagctgtgg aggaagatgc acagtgaag 4860
gatgaagagg aggaggatgc aaagctctta agtatatctg gaaagcgagc tgctctaga 4920
ggtggtagtg aggttccaca gaaaaaaaagt aaaaacttgc tgctaataga gataatgatg 4980
atgacaatga agatgacgat gacaagggtg aggaagatga agaaaaagct cagtgaagaa 5040
atctatataa gatactccag ccaaaattgc acaaaaatca aaccagactg aaaaagactc 5100
aaaaccatca acatcaagac ccaaaagggtc aagaatcctt caaaaaacag aaaaaaac 5160
ctcccaaac gctaaaagga cctagttctg tagaaaacat taaagcaaaa atgcaagcaa 5220
gtacacaaaa aggtggttct cttcccaaat tggaaaccaa tttcatcaat tatgtgaaga 5280
actgttccct aatgactgac caagaggcta ttcaagatct ctggcagtg agcaagaagt 5340
ctccttaata gtttaaacag cttgttagaa aatttctgtc ttatttcatt tctctatcat 5400
ttgatataca cctgtctttt tgtaatgcag agtgagaaat ttacatacca tatctgataa 5460
atgttgtcca ggttccattg ccaagaatgt gttgtccaaa atgtctgttc agttttctaa 5520
gatggaactc caccctttgc ttggttttaa gtatgtatgg aatgttatga taggatatag 5580
tatagtagtg gtcagacacg gaaatggtgg ggatacaaaa atgtgtgtgt gaaataaact 5640
cattattaaa atgttttttg aagtaatttt atatttatag aaagtttcaa acattgtaca 5700
aaattcccat gtactcttca cccagtttcc cttaacgata actggttaca taaaaccagt 5760
gtattcttaa acttttattt tctacagtta tgacagttat atagatatat aattaatttt 5820
tactaaacct ttttaagtga ttttaaatlt tcaactgattt ttaattaact acccactttg 5880
ttaaatltac atattaattc ataattttaa tgaacatctt ttaatagatt ttcttcatac 5940
tcaattacaa atcatctgta aatagtgaag gatttattta tttttctcca atactgata 6000
ctttttcttt tttttacaat atcgcaactgt ctaggattcc ctgaacaatg ctgaaatgaa 6060
gcagtaagag tatcttcgtc ttgttttcga tttaaaagaa taatttctat atttcccc 6120
taaacctgat gtatactgtg gaatttatlt tttagctatc ctttatcaag ttaataaaca 6180
ttttttattt ctatttgtaa aaattgttca ttatgattgg gtagtttatc agctgctttt 6240
aaaacattta ttgaaatata tttcttctc attgtcttaa tgtgatgaat tataatgaat 6300
tagtttgga agttgatatg ttatatttct agagtaaacc caatttttat gaacatttaa 6360
gatcttgatg aactgcta attttatltta ggggtttaac tactatgact atgagaaata 6420
ttctcttata atattccttt cttgtgatat tctgttaagt ttttggattt ggtatcacat 6480

```

```

aggcctcaaa aaattatttg tgatggatgc ttcctacat ccattccttt attctaaaac 6540
aatttgatgat tgggtgtatt ttttccttaa attcctggta gaatttcctg gtgaagctat 6600
atgggttttg tgtttctccc tggtaaattt agttttaaaa acccagtttt gtaagtaatt 6660
aaagaaccac tcacatttgc tgtattttta ttcagtcctg caagggttgc tttttattat 6720
aatttttcca tttaatatat tccatttcat aagtttttga aatggttacg taaagtttat 6780
tttaatatat tcttgytcac cttttaataa cattaaaatc tgtagtgaag tctccttttc 6840
tttcccagtg ctgggcatgc atgcttttcc tttgttggtc agtcttacta gagttcgatc 6900
aatttttacta cttatttcaa agaatcaacc tctgacttta aaaatcttac atatatgctt 6960
gttttctatt ttatcatttt atttatatct tctttgggtt ctttgcattt aatttgctgc 7020
tttgattctc taatgagata tatgctttta aacattaatt ttaagtttcc tctttttcta 7080
atatatacat ttaaaagcat atgtttctct aagttcagct ttatatatca cacaagtttt 7140
cacatgttat attttcataa tgctttattt cagaatactt tctagtattt cactgtgatt 7200
tcttttgaca catgaattag agtatatttg aaatctcaaa atatatacga ttttctaatt 7260
acctcactgt ggtaagaaat tatactatgt atgaattcaa ttagttcaaa tttattgaaa 7320
cttgctttat gctccatata cgggtctattt ttaaaaaatg taagaatgtc cttgaaaaga 7380
atgatattct gtcagtgttag gggatatata ctccattata tatttaaatt atagcaagtt 7440
tatcaagtgt ttaaactctc cacatcaccc ttcactttta ttttcttcat ggtttatcag 7500
ttactgagag acgtgtacta aaatttggtt tgatgattgt ggttttgcca attttttcat 7560
ttgggttcttt ccatgtatac ttaatatggt ttcactgctg cttagacaca aaaagtttga 7620
attgttttat cttcttggtt catagaatat tttatcagta tgaaacacct cttttgatct 7680
ctattttctc ttttttcttg ccttaaagtc catttttctc tgatattaat atggtcacat 7740
gaatttttct tccagttagtt cttgtggata aatttttttt catttccttc attcaaagtt 7800
tctttataat tatattacag aaagcttccc tcaaaagagc atctgttatt acaatgttat 7860
cacctttgtc ttaattgggt aactaaatcc atttatatcc acttatatgt gatttgtaca 7920
accaccaag ctgattctaa aattttatat aaaaatgcag tggggccaaa tgtagccaaag 7980
actgtcttga agaagaaaaa caaacagaaa gatgtgttct agcagatata aagacgtttt 8040
ataaaactac agtagttaag acagtcctgat aatatcacat aaaaagagag aaacctgtga 8100
aatagaatag actctccatg tatacatgga taaagttaac actactgagc cataatgaat 8160
ggatgggtct tttttttttt tttttttttt tttttttttt ttttttgaga cggagtcttg 8220
tactatcacc caggctggag tgcagtggtg ctatctcggc tcaatgcaac ctctgcctcc 8280
tgggttcaac cgattctcca gcctcagcct cctgagtagc tgggaataca ggtgcgcacc 8340
accacgccc gctaattttt gtatttttag tagagatggg gtttcaccat gttgggttag 8400
atggtctcaa actctgacc tctgtattcg cccaccttgg ttctataagt ggtacttgat 8460
acaggcatga gccactgtgc ctggctgaat ggatggtctt atattatgcc atatacatat 8520
caactgtata ttcacattga aacaaacaaa cctgacctct atattatgcc atatacatat 8580
tcaatgccag atgaactatg catctaaatg ttgaagtcaa aaaaataaacc tttcagaaaa 8640
gaggaaaggaa agaataaaaa taatcttttc ttgactttgg gaatccagaa agaatactta 8700
aacagattac aaaaagaacc aatcctacag gaaaagattg ataaattata ccacattaaa 8760
aagttacttt caattatcaa aggtcacctt taagacggtg aaaagacaag atatttcaac 8820
acatgaaact aacactagaa cctataaaga attgctaaat cagtaaggaa aaagacaata 8880
tgaaggtgga ccaaagtttt gaatagatac ttcaaaaaca gtatgtacaa atgatcaata 8940
aatagatgaa gaactgcttt accgcattag cgtctgggca aatcaaaaacc atggtgatat 9000
actactacac ctccaacaga atggctaaga ttttaaaaga ctgacaatat ggagtattag 9060
aaggatacag aactgtgtaa acacttgat gccactggta ggagtacaaa ttgtaactgc 9120
cactatggaa aacacattta aacacatgca tatttcagga ttcagcaata ccacttgtag 9180
aaatatattc aacaaaaatg tccgtacaag tgcaccaaga aacacatata aaatgtccat 9240
cacaacatta gatacaatag ccccaaaact ggaaaaatc ttttatctg tcaaaagcag 9300
aatatgtaaa taaactgtga catttcccta aaagttattt ttatagaatg gaatactata 9360
tgtgaatgga aatgaatcaa atatagctag ctgcaataac atggataaat ctcttaagca 9420
aaatgagtaa gaattatata ttgtatgatt tcatggatat aaagctacaa attaaaatat 9480
agtcttagac atcagaaaat tgggtacttt cagaaaagag aaaggggata ctagtttagaa 9540
aaggaaatgtg ggggcttttc atagagatag agctgacatt actctatctc ttggttgatc 9600
attacatatg tgatctctgt gatatttcat tgagttgtac atttgtgttt tgcagtttcc 9660
tgtataattg ttatattttta caattaaaaa cagtgtagca aaaattaaaa atccaaaaaa 9720
aattaaaagc actgtgatgt aagagaatag ggaacaaaag tctagatctt gagttcatgt 9780
tctttccact gtattactgt ccttccagga aacaaagtga gattatatat tttgcataag 9840
agcaacatgt tatattctta ggtacaaggc cacaatttta cttacaaaga aagctgaaag 9900

```



```

tccccctgca acatgcaaag cgactcagac aaaatgcaga aagggttcag ttgtcagagt 9960
caaagatatt gtggaacgtt ggaagaatat gataatcaag accaagagga caagggagc 10020
agattgtaat gaagacctga ctctccatgc taatgaacta ttatcaattc ctagtgagg 10080
agggattggt ggtggaaact caactctcat ttgaataatt gtcttagaga agtctgcaat 10140
tagttgtgta tgtttaattt gattgtgtaa gtaaatctgg ttataatttt atccaaattg 10200
tgattcatga gtcattcttg aaataacctt ttttatttgt ttgaagtcac taaaattctt 10260
gaccaaatag attgggggaa atatcagaat cagggtgatt gtattgacaa tcaagtact 10320
acactgacaa actattgaaa ttattcagat tgcgtctgcc tgcacctac ctacatgtg 10380
atgacatagg gtgatataca cacagcaata aagaaatata tctggccaat agcagtgaca 10440
taagtcttat gagagtaaca ggaagaccaa gaggtaaaag gaacagtcac ggtcatcagc 10500
tcacatgaga tattgcagga attccttgaa taaggtaaga gggaccagtg agtcagactc 10560
cgagattatt actgtagtta ttgttctatt aactgagttt tgtccaaaac tactatggct 10620
tagagaaatg taggttaaac aatacatcag ccaatgaatg aaaggaggaa gactatgaga 10680
agatgctctc gttccataatc aaaccctaat agtatcccat aatttccatg atgcttaacc 10740
atggacagtt tgcacatgat atatttaaac atctatggca gtcaccaact aagtaattaa 10800
aaataaacct aaaaataaat ggaagaaggc atagcggcca attggaaaaga ggataataaa 10860
tacaatttgt tggatgattc agattattga tattcttgtt taatcattaa ggtaagtttg 10920
tagatataca acataatgag aaaacagtta gaaccacaca gtagagttag gaaaatacta 10980
catatgttga aaagtgcattg tcaactaaa gttctaacaa cattgaaggg aagttcgttc 11040
agggctgtat gtgtagtttt ccaacataat gtctgtagtc tggatatcaa ttgttatgaa 11100
gaaggcttgg ctacacattaa atgccccaaa tcttggtttac ttgccccgtt ttctgcaagt 11160
aagtttaaat ttgacagtca aatttgttaa gtccctgtttc actttgtgtg ccttagtatt 11220
ctcttttatt gcttttttaa tctctctctc cttaaatctg atgatactct tttccaagt 11280
atcttttatt atttttttta ttttattaaa gagattttgt cagtgtgtgt cgggtaaatg 11340
ttgacttttc tgctaacaag acctgtttca cattatgtag cagtgtgtgt cctgtggt 11400
ttgaactgct aactgtccaa gtagtagtcc taattttagt tatttctga tttctgtggt 11460
gtaaatattc ccaccatggc ctatttcaag ctactaacgt gatgttatta aacttagatt 11520
taagcagaga tacacacaat tggttttcac aagtcattta cagtcagttc cagcatattg 11580
tggttagagt ataattttgt ttattgatta tctgggaaaa ttgctaatag ttattttcat 11640
agtaagcttt gttttctctt acaagcttct gccatctcca aaacaaacaa acaaaacaaa 11700
tgctgttttg ttgtgttgtt tgttttacac caaagcttgg gattcattta ttcaaagctt 11760
ccatattttt tcacagaaat tctaattcct tatgatattc cattaccagc attcagcccc 11820
agtatatact tttattctac tcaacatacc tctctctac caaaaacaaa acgaacaaat 11880
ccaaacagag ccatccacaa ttccaagaag tcttaatgtc tttatctatg ctttcccat 11940
acatgataat cttttcctta gacattagct catattagtc tgattttttt attcaagacc 12000
aattaaatgt taaaatatcc ctcgatctct gtagttaaaa acaatggttt tatgttatat 12060
tcccaaagca ctttgtttta cttttactta attgaaact tttgggcaca aaatacatgc 12120
ccaataaaaag actaatgaat ggtcagataa atgaatgtca tttcatgttt gtttcaccat 12180
ggcaaagaac tgctttcttt cttttattgg ttaccacaac ctgtgaaata tccagggtccc 12240
tggcccatat tctccttaac acctctgaa aaacctaaag actatataga aaatttatat 12300
aatggagttt tgaattatcc aaacaacgtc cacttcattt ggcatttgat aaaagatata 12360
aacaaaaata aatccacaac caatttggct ctgccttgtt gaatataaga aatgcaacat 12420
cacaggccac atctacactg aaaagtatct tcaaataata ttttcccaa acagttttat 12480
tctctttaga ttaccacac attctctttc agagtatgga gagccttcaa agtttaaaag 12540
aaaaccatag aaaaacacta ttctgacata tcatacattg tccctgtatt cagttcctcc 12600
ttcctttact catgaatggc aactatttag gagcttgtaa gctttcccag attcacacca 12660
attccccaat ggactaagct tcagccatac ataattctaaa ggatgaaaaa gatggcaaaa 12720
caacttccct attcggaatc caatgaaaac aaaccctga tgagcaactt ggacaacaac 12780
atctcaagag ttcacctcag ggggtggtgt caacacttac tagagtcaat tcaagagact 12840
gtttcagcag ctttagagca aaacgtcatc tttaaaagat tatcaaccaa cacaatcact 12900
aagtttagcc actgtttgtg aaattcaagt caaatagaag cagctgagca tactcaacag 12960
gagatagcag ttattaaaaa gaaactggag agagggaggg agaaaaggag agaggggtga 13020
agggagttag gaagtgaaga ataacgggag ggaggcaggg agggaaagaa aagaaaaaaa 13080
aaagaagaga caaaaaaaga aatcagaatc caaattttaa aaagagttag ggaaatcaaa 13140
acatgctata tgctccaagt gtaaatgctg aacttgcaat actagaggat ttaccataat 13200
ctcaacagct tccagacctg tgacaatttg ttttgctttt ttctctaac aagcttagaa 13260
atcatcattt attcgggtatt gacaggtgat cttctaatgg ccatgttctc aactcactac 13320

```

```

ccaaggettc tactactaca tgcctctccc tttctttgac ttgcttgaag tttttcaatg 13380
tttttgtttt agattccata ggaatggcaa ctgcttaaag cttttctcac ctcttgggaa 13440
aattttcttc agaggaagta acccggggtg ccactaattg gctttgcata acagtaggca 13500
aatttggcct taaagcaact gtgacactgt ttgccaatca gctcaaatac agattaccac 13560
aatcagatgt tctgggaacc tcacagatgt ttctattatg aattctaaaa actatgtggt 13620
tattgacaca agtatcccta atgcctttcc aagcaactta atgattcttc tcatttaaata 13680
attcacttca atttcttgca aaccccaagc tgggtgtttc aagtgcctca ttgaaaaaga 13740
tcaaaaatat tcattcatgca ctgattggac tgataaatct aagtctctaa ctttgccaag 13800
aaaaagaaaa aaatggactt ctgggtatgt ttcaatatca gttgcctcca ggaatttcc 13860
gtaccatgct caaattagtt ttaatccaat agtatactat ttgtactgac cttgtacata 13920
tttctgaaaa gaatagttaa gagatgtttt gctaagtaga tcattttcat gataaagata 13980
tttaaaaaga agaaaatgca tgttttgggt gcaacactca gataactaaa atttttaaaa 14040
atcaagtttt ttggtacccc tctatgtgtc tacacagatg cacagctaac ggcttccgtc 14100
gattttataa ttactttggg ttatgtaata catattatc tgctgatcat aagccctaag 14160
aagcaaaatt ttgtgtatt gacatggcct ggccaaaaac aacaagggaa agaaatagca 14220
ttcaaaaaac tggcaaaatg tttatgaatt ctaatcctct gcacatgaat aaatacatct 14280
gacaaaagac agagggccct agaaagggcc ctcttgacct ttctaattgg agttcaattg 14340
caagttcagt gttgagaaac taaagcgggt tctgccaatg ttttaagttc aagctttact 14400
acattttgtt atttgaataa gtgaaatccc agataatgag ttctaattgc tctattaatc 14460
actgaataaa ggggtttggag ggaaactggg atttgaatac gcaatctgaa agacatcctt 14520
ttgtattttt ttacctacag cttaccatat acatgtaata cgccttatat attacttttc taaaagaata 14640
tttttaaaaa atggtgaagt gtcataatga tctttgacct ggaaaaaaat acagaaaaac 14700
aaatttaaaa cttcagtgta gtcataatga tctttgacct ggaaaaaaat acagaaaaac 14760
aggccttggg ttataaatta tattgtcaat gaaagtgaga agaactctcc attctttaat 14820
gtgttttatg tatttatatt tcatttccct ttcccaaatg aattataatg tacaacacat 14880
ttgtattttt ctttaatttt tcacttttaa taatctttct ttttctaac tttgttcttc 14940
catatactga tagacctgac acaacaaaat ttacctttca aaaattcaat aatcccatat 15000
tcattgttac ccttaaagta tctgctagga attctatatt cttatttatg ttcccaagaa 15060
agtttaatgc aaaaaatata gaaaagcata cattatttaa acctcccttc ctttagttta 15120
tattgaaaaa attttaggtt gtgcttatgc aactgaagac caccaaccaa aaggggacaag 15180
ctggatttta gggcatcata ataactaact caaatttacc ataagacata catattaatt 15240
agtaagttca atagtcaata tagccaaaaa taatcatttc agttagcact tactggaaat 15300
tttagcaatc taaacactca catgggtcagg tttaatattg tccagcaata cttttatttc 15360
tttctctttc tcaagcctgg tctttctaaa catatagaga aaaggcacag gtctcacact 15420
ttaaatcagg tgacatcatt gtcattcttt ctgcttcttg gtctccaatt aaattccctt 15480
tccttcttag gcccagggtt ttgactatct ttgcaatat gcagtagatt attaatgttc 15540
aaactctgac cagttgggtg ttttcaaaac gatgcctcca aggtagccaa cagttgcagt 15600
attcactctc ctttttctat ctttttggaa gtcattcata aatttaaaag ggtgggtttta 15660
atatttaatt cagcattttg agattttttt ttattattat tttttttgag acggagtctc 15720
gcctctgtcg ccaggtctgg aatgcagtggt tgccatctcg gctcactgca agctccacct 15780
ctcgggttca tgccattctc ctgactcagg ctccggagta gctgggacta caggcgctg 15840
ccaacacgcc ccgctaattt ttgtattttt tagtagagac agggtttcac agtgtagcc 15900
aggatgggtc tgatctcatg acctcgtgat ccaccgcct cggcctccca aagtgcctgc 15960
attacaggcg tgagacaccg cgccgggcca gcgagatact ttcatatagg aatatttaag 16020
aatatgtaat ctctcatatt gccatcaatt tttttttttt tttttttttt ttgagacgga 16080
gtctcgtctc gtcgcccagg ctggagtgcg gtggcgggat ctccgctcat gccatcaatt 16140
ttaaagtcac taattgctct acaaaagcag tgtatttcat ctccacgaaa agcacgtgta 16200
ctaaaatggc cagagttctc ccagtcaaaa ggtcatagaa tggcagcaag gtacaaaaa 16260
cactttgctt tacagtaaac acagataaat taagaaaaac atgtaactcc acacagttga 16320
atctgttctg aaacataatc atttcttaaa gaaagagatc ataggggaga tcaactccatc 16380
ctcattggaa atgttgggtt aagagcaaaa gattatgagt atagagacat ttgaatgcat 16440
gtgttcaaaag aaagccagta aaatccctga tttccttcca cataggaaga aaagtagttg 16500
gcttttgcaa tcaggttaaca tttctttctg gctaggtcaa ttatccatgg agctacagat 16560
ccacaacctt ttctgattgt ctgcacatct ggtgtaagcc tttataatgc aaatattaat 16620
attattatgc ttctgtaaca tatttctata attaaaatca aataagtgat ttcagaatac 16680
aggtgactat gcaaaaaatg ttatctaggg gacaaagaag caccacaaca tcaacttata 16740
aaataaaaaa agcatttatt tcttgcactc ccttactgcc acaaaaaaac actcaacatc

```

ctgtttgaca ttattggtgt acagggatca cagaaagaca ctaacatttt agaaaatttt 16800  
 acacacgttg aattgtgcgt gatctgaaac agcagcactt tgttgacact aatcattaga 16860  
 taattacatc ctttgagtta ctgtgctgtc taaaattaac aagacagcca ggcacggtgg 16920  
 ttcaggcctg taattccagc actttgggag gccgaggcgg gcagatcacg aggtcaggag 16980  
 ttcgagacca gcctagccaa catggtgaaa ccccgctctc actaaaaata caaaaattag 17040  
 ctgggcgtga tgggtgcacac ctgtaatccc agctacttgg gtggtcaggg caggggaatc 17100  
 acttcaaccc ggggtggcggg ggttgcagtg agccgagatc gcgccactgc actccagcct 17160  
 gggcgacaga gcgagactct atctcagaaa aaaaaaaaaa aaaaaaaaaa aattaaacaag 17220  
 agcaaagtac ttgagcaatg ctttaagtttt ctctctcata ttttttcttc aaattaaacaa 17280  
 catacatttt tacttcaata tatatgaaaa ataatacatat ggaaacatta caggtttgtta 17340  
 aaataatgat gacaatagta actatgtgtt ctatgtgcag aagaaaagggt acattttgtt 17400  
 ttataaaaaa ctacaggcaa aggcattgcat tacagttaaa aaaatgatat gaatgataga 17460  
 tttttaaaaa gattttgtat atgtttatct aataagcaaa atcatattgc aaattcataa 17520  
 aagaaaggca aaatgcataat gatagtctta acactactgt ataatacacta tagaaaaatag 17580  
 attaatggat aatattaatg aatacataga aactttgaaa tatttgctga attgcaacta 17640  
 attggttgaa aatgttgcca tgagctggaa gtgaacctca tagcaattgg atctgaattc 17700  
 tgcagagtag tcagaaagta tgttgcaatg tagccatgtg atgtgaaaga aaatataatg 17760  
 gtctttggcc atttagattc atgttcatgt cttggatctt ataatgcatt ctgactgcat 17820  
 gactttggat ggattttctc acatttttga gactcattct caccatctgt aagatggaaa 17880  
 tacttacctc tttagcataaa gaattcttaa atggtgacaa aaatagttta ccaattttta 17940  
 aaacagtttt tttttcccag aaataacata accctacaag aaacctccag acattttttta 18000  
 aagttttatt tcttattcaa tgtttccgta ctcatgggtt gggtcagtag acaaaatggt 18060  
 cttatttttg agctccatgg ctaacctgat tgaagggagt gagtgctatg tggattctgt 18120  
 acctgggata acattgtagt atacgagaac atgtaaaact atctaaggct taccttcttt 18180  
 cttaatggta agagcaatgt taagctttct gagtatgcag aatttttttt tagtttaaaa 18240  
 atatgcatgc atacatccct gattctttac cctgcccct ttgtactttt acttttttac 18300  
 ctcatttctc agaagggcatt ttacacaggc ttctgatgca tcacagatgg ctgtgagatc 18360  
 atgtctctct tctagagcca acaccacag tccatcagcc aatgtcatca attgcttcgt 18420  
 caaatgacca aaacctacca taatacaaac agaacatttc aaagtattaa atcaagagaa 18480  
 agtgatcact agaattctaac attgagcatg tattttgagt aagtcattac taagcatttt 18540  
 ctgtgtgcta actcatccaa tacttaaaac aactttatgg attaggctct attattatct 18600  
 ctattttaca gataagggac ccaaagccca agatcccaca gctaagaagt atcacaacca 18660  
 agactggcac caatctagct cttcaccagt gcacagggct gcttttcata acatggctctg 18720  
 tatgtatctg gataaaaaaa ctgaatactc ttcagcaggt gttacaaggg taaactcttc 18780  
 catttgctta ccatatgctt cctgtcgcta tcaatggcct ttattataga aagttttctc 18840  
 tgcccaaat tgctatatat tacaatttta cattatctaa tataatattt acattatcta 18900  
 atgtaatgta aaatctatta cattagattt gagttataaa atacaataat atgacaaata 19020  
 ataaatgcaa aatatgaata acatctatac gagttataaa caacactttt tcaaccccc 19080  
 tctgcttttt taccttccaa ctttaaggaaa attaggttag agatcaggat cctgagttta 19140  
 tgtgcctttc tctgacagta gctatctctc tcttgtgtgg agatcaggat aaatgggttt 19200  
 taattccatt gctttctctt tctaaatttc cttgtttttc aactttataa gatccctgta 19260  
 acacttttgc aacttgctat tttcatgtat tttgttagct catctttgtt cccattcttc 19320  
 gctatagttt ttttgcgtgc tagtaggcca ttatatgtca acagagggtta cccattcttc 19380  
 tattggcaga gagttgggtt tcttgttatc accaaattcc agtttttttg tctgtacaaa 19440  
 taacgtcgcc atgaacattc ttacacgggt cttctgtgtc acatatgcac atgtgaaaca 19500  
 gaattgttga gtcttaaaaa tctgctaaat aatgccagat tatttccaaa gggctattac 19560  
 caagccccac cctcagaaac agtatatgta agaattccag ttaagtcaca tccttgccaa 19620  
 catttggtat ggtttgccaa gtgggtggca aaaaaatggc atcttattgt gttttcattc 19680  
 agtgaagag gggagttttc tttttctaata ttaacttaga gatttcatta caaatgtaat 19740  
 ttaattctaata tttttcttta cacagataga cttttcccca taatttcaca gtgctgttag 19800  
 ttacattaat taatatttca aatatgaagc catcatgca ttttaggaagt aaaataagct 19860  
 tggtcataat gtattatctt ttttagtacac acctggattt gttttgctaa tgctttaaga 19920  
 tttttttgag tatgttcatt aatgggggta atctgtactt ttccattcct gtattggcca 19980  
 taatgaattt tgatgtgggt gggacctctt gtttttatta tctgatgcca gaatgttggg 20040  
 gacaaatctc gtatgaaacc attagggctt tgtgttcaat ttgaagaata ttttttagtat 20100  
 tgattgaatt tttaaaggga ttatatcact acacctgctt tctatatcgt cctaagttat 20160  
 atttttacag gcgtttcctt cttttatttc attgttttaa tttgctgaaa taaaatgttt

gtttactcta ttacattatt ttgaagttcc acatagatgt aggtggacat tgtctgtaaa 20220  
 tttttccttg atctaagttc tctttcatat ttcccatctc tctctgtcct gcattacgta 20280  
 tatttttgaa tcagagctgt cttccagact ttccctcttc agacatctct aatctgtac 20340  
 atcacatctt tagtgatatt ttcatctctg tgattgtatt atttaactct agaattccaa 20400  
 ttttgttcta tttcgtgact tattggctcat tatgatactt tcttaactcc ttgtttatgt 20460  
 ttttatttct tcttttattt ctttcagcat aattatttta tattctgtaa ctgacatttg 20520  
 aaatcttttg gtttagtttg ctctctgttg tttctgctga ttcattgttca tgctgcctta 20580  
 attatccctt ttttaaaaac ttttattaat ttatttaatt tgtggagtac tttgagcttg 20640  
 tattcattgt aactttatat gtgaaaaata tttgaagctt ggtgcaatgg actgaatgg 20700  
 actacacccc aaaatttata tatggaaatt ctaacctcca atgtgatgtt tttgagaggc 20760  
 agcctttgat aattatgtag agtcttcacg aatgagatca gtacccttac aaaagggacc 20820  
 ccagagagag tctctagct ctctgttgct cttctaagga tccaaggaga agttggcact 20880  
 ctttaatcca gattaggtag agtctcgtta aattagattt gtacccttaa caaaaaggac 20940  
 ccagagtctt ctagtctctt tgttgccctc taagggtcca agtctttact tggcagtctt 21000  
 tattccagaa ggccttgacc agaacctgac catgctggca agctgatctc agacttacag 21060  
 taaccagaac tgtgagaaat aaatttctgt tgtttataag ctatcagtct atcgtatttt 21120  
 gatacagcag cctgaactaa gacactgggg ttgaatatgg tatctgtcat tcaagtctgg 21180  
 ctcaagtgtg atattgtttg cttttgctgg atatctggga cactaccttc taggacctat 21240  
 tttaaattct tatatggcaa gactgggtgt ggagtttgct gttttgttt gcacatgtat 21300  
 attataaata tggaccttaa aactttatta caaatctca tggagaagaa agtcaggaca 21360  
 tcctttcttt ctttctttct ttctttcttt ctttttttcc ttcttctct ccttcttct 21420  
 ttctttctat ctttctttct ttctttcttc ttctctctt acgttcttct tctctcttct 21480  
 tctgaaactt tctttcgaa atctcttcta ttggtggcaa aagctaagat agatatgatg 21540  
 ttttatttag gagtattttc ttttctcta ttattctct tccaagtgt tggccatttg 21600  
 tcattctttc tttattctgg tctccagtta aattccctcc cettcttagg cccaagctc 21660  
 tgacctctt ttgcaatatg cagtagatta ttaatgttcc aactccgacc gattggagat 21720  
 tttggtatag atgccccag gtagtcaac aacttcagga tttactctcc ttttctatc 21780  
 ttttggagat caaccacaaa tttaaaagga tgattttaat atttaattca gcattttgag 21840  
 atactttcac ataaaagtgt ttaagaatat gtaatgtctc atattgcaa atttgaatgt 21900  
 ttctcattca acatttagaa aaaattatca tggcatccga cctgtccaat ttcaggggca 21960  
 attgcaaaa ggtacggtaa ataaaaata atgaaaacac gtgtttcagt agaacatttc 22020  
 attttttata tgccttggtga acttacagca aaaaatttta atttttaaat caattgaatt 22080  
 tttcataatt catagatttt attttttaga gcagttttgt atttacagaa aaactgagca 22140  
 ggaagtacag caagttccat atccagtctc tttctttcca tattaacatt ttgcatcatt 22200  
 ttggtacatt tggtatgatt gataagccag taccgatgca ttattattaa ctaagtata 22260  
 gttgaggttc acactttgtg ttgtacattc tgggtgtttt gacaaatgca taatgtcacg 22320  
 catccaccat tatactatca gacagaatca atgactgcc tgaataattc ctgtgattta 22380  
 cctattcctc ctccctctct gccctcaac tctgggcaac caatgatctt ttaattgtca 22440  
 tagtctttag tttgaaaaga aaataaattc tcaggatgta ttcactagaa ttaattgaaa 22500  
 gcctataaaa tcatcagata atgagagcct gaaactaaat taggttgctt ctattttgaa 22560  
 caataaaaata atacattaat cccggtaatg cattaaaata atccacttg taaacaactg 22620  
 cctagatttt ccttctgtgt ctgacacttg atgttcacca tgaacaggat gagtgaatct 22680  
 cctcaatate ttgaagcact ttaatgttga ttttaaccac ttaactacta tttggatgga 22740  
 agtcaaatata gtcactttac aattatcacg ttttaaaatt cttgacaaaa atacatttaa 22800  
 aaaggattta aaaattagtt aaaaactgtt atcaagcatt ttagtttttc tcaattccta 22860  
 tggacctcat tatgatgccg ataagaatct tttaccagg ccacttagga atgaggctgt 22920  
 ccacactaaa ctaccttatt accgggatga caataaaaag aatgataaac attcagaaaa 22980  
 gaagtaacgc aaaattttga tccctaattg ttgaaaatgt tctttccctg agccaagatt 23040  
 aatagcacat agtaattagt accattctag aaaattttatg taaaaaacct aataggttag 23100  
 gacacatttc tgtaatcat attattaaat attctagacc gctttttctg taacctaaac 23160  
 cagggttaca gttataattt taaaagatat aataaatcaa gccagaaatc ttactaataa 23220  
 tttctagtaa ctgagaattc aattatctaa agtactact gaacaaacca aatcactgga 23280  
 ttaaagaaag aaagagacag agcgatccaa atctggttta agttcactct tctctctggc 23340  
 aatgaaaaaa agtcccataa aatgcaaat ttagatggga tagtaaaaag tggagggaaa 23400  
 gagtggaaatg aagttaatct ttgatctcta tccaaattcc tctttctttt acctacaggg 23460  
 tttatttcca ttcacatgtt acccatgtga tctctgcagt cagagactga ggcagctgaa 23520  
 ctctaagtta tgcattgcaca aaacattcaa gtgatgtaag gaaagttcta caaggcccat 23580

```

gccccctttt caaatcaaaa taagcaattc agtatttttt ttttaatttta ttatcctgaa 23640
ttctgctgtg tccactgtta ctgtacatat tagaaacatt aaaaatgcca gccgagtgtg 23700
gctaccaggg tgaaggtatt atttttcagg acatattaaa ggtttcagtg gcatgtgtac 23760
gtgtgtgtgt gtgtgtttgt gtgtatgtgt gtgttagatt agagcatata taacaatttt 23820
agtaggcatg attgcaagtt tcatgtaatc atattttact ctagcttcat taaagacaca 23880
aaagctcatc ctacatttga cagttaaact aataacacct tcagagtga aaaatttttag 23940
cacagacctt cctcaagcgg ggttgagtgt tttgagtgtg agggctgatg ggctaagtga 24000
ttaagtggaa aacgtgttcc tataccatgg taccttgtag gctcaagcaa tccactggaca 24060
tagagatgga acgggggttct caacaaccac atagggcatc agtttcctaa ttgagtgcag 24120
agctgaggga ggagcttgga tgcctcggag cagccacatg tacaggttca tattgggatg 24180
cactgactaa aaatcagcct tgacagacat cccattacc tgtattgact acaaaagaat 24240
ctgtatactt tatagggtgt gggttctgtt aagaaatcat attgtttcag atattttttt 24300
ttttgaggcg gcgtcttgtt gtgtcacctg ggctagagtgt cagtggcgtg atctcagctc 24360
actgcaacct ccacctcccg ggttcaagca attctcctgc ctcagcctcc cgagtagctg 24420
gactacaggg gtgcaccacc acaccagct aatttttcta ttttttagtag agacgcgggt 24480
tcacatgtt ggttgccag gatagtctcg atctcttgac ctcgtgatcc accagccttt 24540
gcctcccaaa gtgctggaat tacaggcgtg agctaccatg cccagccgtg tcagatactt 24600
tttaaagag atttgtaac ttaagctttt cctacatgta gcctggttgt tttaaaaatt 24720
aatcaaacac cacatctact actaaagaat aggattctac attgtaacaa atcatttctt 24780
gtctatcagc attaaattat aagcatgaga aggtattctac ttgaaaccac tgagaaagag 24840
ttgatgacca agtggagctg aactggtaat taccatgacc ttgaaaccac tagtagaaac 24900
aattagaagg gctttttcag aatgaaatcc tctgttttgt tccattaatt tagtagaaac 24960
aaatttaata tttttgatta taaaaataga attaaataag ctatcaatat ggtaatgggt 24960
tcaaatatc aattttcaatt tgatttctctg atactttata ggggttgggt tctgctaaga 25020
aatcatattg tgtcagattt ttctctagtt tagaagtgtt ttgaaatgaa aagttgctct 25080
aagaaggctc aaagattaag ctttatatac gtattttaata accaagtcag atgacacaaa 25140
aggattcatc cttcaagggtg acatgtctca aatgcttctc tctaacattt ccaaatagtt 25200
ccagagaat agtggtagtg aaaggaaaca accttaacta gctttatttt aattttcatt 25260
aaaaaaaact atattaaaaa accaaaatta ttgcattctc gttgtaagaa atttggaga 25320
tgatagaaaa taataataaa atagtataat aataaacagg ctctatgttg tgatatatca 25380
tataaagtgt tatcttttat ttgataaata aataaaataa atgatcatca tcaaataatt 25440
ataaataata ataaatacat agttccatcg accagaaata gccaatctca cctttgtgta 25500
tttcatgctt cttgttgtat tttctaaata aaacaaaatc attctgggtt tttaaaaata 25560
catttaca aaatcgtttc tggatacatt tttcatgttc tctacaatat catttaaaat 25620
gtaccatgc accaagcaat tctgttttta gatatttaag tgtgctttag gtttttagtt 25680
taatatacaa gatagcaaat aatagcctag tgtataatca aagtgaccaa tgtatgttag 25740
tgtttatctt attctagtgt tattatgtat tattagggtt ggaagaagcc ttgctctttt 25800
tattgctaac ttatctgttt caccagagca tgggctagaa cctaaagcac ataaagccaa 25860
aaggagaaca aagtacagtc agaactgtat aaactttttt cttttagaac ccatgtatat 25920
ttagcaatgc ctattttgaa taacctaatg ttttgataga agctcagaga aatgagagat 25980
tctcccacaa aatcgtttc tattacaaaa ttgcaaatgg aattggaagt ctctatggag 26040
gccaaaactg agttaatgct gtagtaggtt gaacaggga tctctccaa cctacaattt 26100
agttactatt gctatcctgc ctcctgtag taaaatagaa cagactctag aatcagcagc 26160
caattctcag agaaagatac ctcgatcatg attcgtttgg ttaataaaga aatggtgaca 26220
cattgtgate tattggataa gtcattttac ttctacttaa acatttggtg acgttgctga 26280
tgccagtctc ccattcatga caagtctccc cccaactatt attttctttc tattgaggaa 26340
agcctctagt taaaaaaaga aacaacaaaa atgattctgg caacctccat cctcactctg 26400
ccattcagca gcagaggcac tggcatcaag ataagcagga gtgaaagctt ttgaaatact 26460
cactgacacc tatctcatga tgatttgtat taatttgtaa ctctctatg gctaaaaagt 26520
ctcactacca atttactcat ttattaacat gtcaattaca tttgggctg aaatgtttat 26580
gaagacttca ccacacattt aatatagtag ggaccaaagg agtcacacat tgttgcccta 26640
ttttcatttg aaattaaatt tttctcatcc attggactac cttctgtagt tatatccaaa 26700
aagtattact gaagaatgca catccaggga agtctaatta taaaaactgt agccattttc 26760
ctccctctct aaacccctg gtcattaagt taccatgtta ttcttttagg aaatgcagtc 26820
aggctcaagt agagagagaa attcgggtag catgtggcag tctcatgtat tgtgaggctc 26880
tccagcagga cttcaaagca gaatctgatt gttgcagatg ggaggaatgc tttccacaga 26940
aatacctttt taagactcat ggtgctgtaa ttcatatggt aggcacttgt gattcattcc 27000

```

tgatgatgtt gggatcattt aactcacaga accattgtcg ctaccataaa gtcctttcat 27060  
 ctgtagccaa aaaggtttat ttcattgcaa tgaaaaattt tcattaaagt atcaccttaa 27120  
 taacgggttaa agatatatat tatctgggta tgtttaaaat gtaatttat gaacatattc 27180  
 tgaagattca tttcatgtta agattttact tatttgatgt cccaggactc ttccaagtt 27240  
 cactgaatcc ggaaatcaat tttataagaa atatggagat tattaccatt aaatctttca 27300  
 attggcttat tccaagcagc cctataaata ctgcatatgt tttaaagaaa gcattttcaa 27360  
 tcacagtaaa aatcctttta ctcttctagt cagtgtatgt ccaggaggta agtttatatt 27420  
 ctcagcacct tttgaaagca aatgaataaa ttgtatccta aaaaaagtct gaaacaacag 27480  
 aatacttcaa tgccattatt ttttgtaaga caaaattgat cctcagaaat tcctgagaaa 27540  
 ataaatggca agaattgatt actggaactt tagttatcca tcaatccatc catccatcca 27600  
 ttcacccatc cctccatcca tctacgatcc aactacaaat caactattat ttacaaaaata 27660  
 cctactctgt gccacagttt tatacataat tctgatactt ctattagata tgagttatta 27720  
 taaactctat ttgaacctca gttatattac tctataaata aattaaatac tacttattct 27780  
 acatcacagg tttgaaatga atatttaatc attaaaggcc aactgcaaaa tggatacaca 27840  
 gtttatcaaa cagagtctgg catatggcag atgctcagta tttatacatt tttttggaga 27900  
 tgaagtctca ctctgtcatc caggctggag tgtagtggca tcatcatagc tcacttaacc 27960  
 taaaattaca gggcccaaac aatcctccca cctcagtcta ctgactagct tggattacat 28020  
 cccactacca caccctacta atttttcaat tttttttata aggacagggt cttactatgt 28080  
 tgcccaggct ggtctagaac tcctggcctg aagcaatcct cctgcctcgg cctcccagag 28140  
 ttctgggatt acagggtgtga gccaccatgc ttggccagta tttatacttt taatgaaagc 28200  
 ttttcattta acaattacag atctagatat aattgcaagt ttacatactc caattctatc 28260  
 gttttaagaa gtggatgagg aaactaaggc ccatagtgtat accagagagc aattttttga 28320  
 ggaaaagtaa agaagagcaa gtaaaacatg aaaaatgtta tgctcttatg atatatctgc 28380  
 tatagaatat ctagtatcct ttttgaacaa tgtttttaaa aaagacattg tggccaatat 28440  
 aagtagaaaa tcatgttcaa agatgggggt gagggtgagg agtgagagat gtgtggggaa 28500  
 gaagttcaag tccaaataaa tataacacac caaatgaaaa aggtcgaagt cttctggcc 28560  
 acaaactctt gttacatag gtgtatggaa aaaaaaagat gtatttaact aaaaaaattt 28620  
 aacttataca aaatttcatt gatttagttt tacacagggt aaaactaaaa caccatgtat 28680  
 tcaagaggac tcaaaaaata attgtggtag atccattcaa ttaagagata cttactaaga 28740  
 agctactatg tgaccaagga actgtgctgg caatgaaggc atagtattga gccaaagcaa 28800  
 ggtgttcatt accettatat ggtgtataaa ctaatgttag tgagacctaa tataaccagg 28860  
 caccatgcta agtgctgaaa tgcattatct catttatcca ccacacaact tcccaagtta 28920  
 taagaacatt aacttgccca agcaacaaag gtcaatcaat gacaaagttg ggataagagg 28980  
 ttgggtcagt tgactttagt gcctgtcatc caagccactc ttctgtggct aaatccaagt 29040  
 aatattgaag tgcaaattta atgcattagt actacaatca cagtgccagt tgtgctgaa 29100  
 aaataatcct caaacgttaa tgactgtaac ccattcttct tactcaagct acaacttaca 29160  
 gtagttaaaa ctgatccact tgcatttttt tgctattttt tcagtttgaa aaggaaatat 29220  
 atcacccctt caaaaaacta attccttttc aaactaacc cttgcatctaa gcttgcat 29280  
 taactttgag cacagcatta attcatggca gtactcccaa aattcaactc aggttatgat 29340  
 ggccatggca acacttataa ttgaccattg ccaaaaagct tatgcaactga tttgccataa 29400  
 tcatcctcac ggtttctgaa tgcctagtgt ctttttataa actgatattt tcaactagca 29460  
 tagtacctga cacacaataa gttatctggt ctttaaaaaa acaaacaaac aacaacgaaa 29520  
 atattactat tgaatctcaa tgtgtatatt cttcacaaac agatgatcat tcatctttaa 29580  
 agtgctagat aagtatcagc taaattacac agatttggtta aatggtagaa aaacaaaacc 29640  
 gctgccttct aaggaaaaatg gggacatgtc tcattgccaa aaacattcct tgggaattga 29700  
 tttcccaaat gaccagggtt ttttaattca agacaaaaat acctgatttt aaaagataag 29760  
 tatctaccct ctgggcaaaa ctgatgactt cttatttttc ctgccataag tccagggttca 29820  
 ggaaccctcc gaattgtaag ttacaagcaa ccatttaatt tagattaaat tagacagcaa 29880  
 ttgtatgtta actaaatatg aaatgcctct gttaaagatt aagaattcca 29940  
 tagtatataa gcttctatta tacatttggt attgatgatt tttaaaataa atcaccattt 30000  
 aatagaaata cttaaagaat atttgcaaaa gaaaggataa catttagcaa aattcataag 30060  
 catctaataa gcccaatagg atagtttagga tagttttttt tttttccttc ctttttttta 30120  
 aaacaggcaa ttctccaaca tcagggcaga aaatccgcag tacaacacatg gccaaagatcc 30180  
 tacaccattt ttacaaatgc catgattcaa cctgtcaata tggataaaat aaaggcttct 30240  
 tttcaaatat ttatcacagt ggttttgttc tgttttaagt ctattccac ctgccattaa 30300  
 aaaaatcatt aaaagaaaat aaagactgcc tccaatttcc atgaaagatt tccatataac 30360  
 tatcattctt tggggaataa cattacatat tccatagcgt attggatcat tgtttttatc 30420

ttgcatgatt ttcctacctt tccaagttgg aggtgtggga catgaaaagg gagtctttcc 30480  
 tttattatgc cagaggtctt tcatcttaag ccatgggtcta cttgtgagtg aagcccaata 30540  
 tccaacttat ataaaatgct ataaaacctt cataatggta aagatagagt atttcgggta 30600  
 aggcgggtgac attttaggtc aaacacttca agacacttaa ggtatctgaa agaagatgac 30660  
 aagattgttg aattgaatga tgagagagtg aggtaagcag aggacagatt cagggtgggg 30720  
 agatcaaaga taaagaggag ttgccaggac tttggggaat agctgggtat gtaccagaat 30780  
 aaataaaaaa gcactatgct agccattcta gaatcggtca aactgagagg tcatggaca 30840  
 ctttcaacaa ggggtctataa tgagattagg caactacttt tcaaaccaaa gaagctcgca 30900  
 gatgcattag actgggagtc aagctggaat acactaggga tacgcagctg ttgagtctat 30960  
 tgctctaacc ttagagtgtg agtttagatt tttcaaaaat agttaaaatt tcagaatctg 31020  
 gatattaacg gatagatgta taagataaaa aaagtagcac tttattaaag tgggaccatc 31080  
 agcatttcac tttatccaat cacaagtatt atagcttcag aaaataatag caactgggtg 31140  
 ttcaaaaatta cctaattaat aataggtgac aaaagaaatt catagtgact attaaaggaa 31200  
 taaagctttt atcattatca ccatgtgtca aaagagttgt gtaactcctc ctaataattt 31260  
 ccaacttcaa attcattgaa gagacattac ttctcttagg agacaccag gcgttctctg 31320  
 ccagctgctt aaacctctc tagacatttg tctcttagg agacaccag gcgttctctg 31380  
 gcttaggaaa attatctagt ctaccttggg aagcatcagc aacagagcca ggggtggcacc 31440  
 actgattctg aatttggata aaattaatca ataatttcaa atgatattag taactaaatc 31500  
 taactcaggt tctatagcct actgcataat tggacctgcc aattcccatc tctggacttt 31560  
 gctttgtttc tctaagggtc aaatataagt gtcagactaa ctcataattc ttaaagtgga 31620  
 gtttaacctt tggtaataca gaatctcctg ggtgtttgtt aaaatgcaga tttgtgagcc 31680  
 tcatcccaga ccagtttga atccaaatct ctgcatttaa agtaagttcc tctactgagg 31740  
 tttgagtttt tccactgagg tcttctacc tgcattgagg tttgaaggtc atctgactac 31800  
 aaaatcttga aggtctcctt ctagtctgtt cattacatta taaataatag gtttaattat 31920  
 tatttttttg ggaaaaagaa attagactat taatttagca cagtgtcttg ttataaaagc 31980  
 atagaaaaca tatagaattt aaaaatagga tattattata gtttaagttg tagggatcat 32040  
 aatttataat aattaatgtt ttttaattat atacatgtgc catgttgggtg tgcgtgaccc 32100  
 gtgcacaacg tgcaggtttg ttacatatat tccaatgtct atccttcccc cctcccccca 32160  
 attaatcgtt catttagcat taggtatatc tccaatgtct atccttcccc cctcccccca 32220  
 ccccaaca gggcccgatg tgtgatgttc ccttctctgt gtcctatgtt tctcattatg 32280  
 cagttccaac ctatgagtg gaatatgagg tgtttgggtt tttgtccttg tgagagtttg 32340  
 ctgagaatga tggtttccag cttcatccat gtccctacaa aggacatgaa ctcctcctt 32400  
 gttatggctg catagtattc catagtgcac atgtgccaca ttttcttaat ccagtctatc 32460  
 attgttggac atttgggttg gttccaagtc tttgtctatt tgaatagtgc cgcaataaac 32520  
 atacgtgtac atgtgtcttt atagcagcat gatttatagt cctttgggta tataccagc 32580  
 aatgggatgg ctgggtcaaa tggatattct agttctagat cctaaggaa ttgccacact 32640  
 gacttccaca atgattgaac tagttaacag tcccaccaac agtgtaaaag tgttctatt 32700  
 tctccacatc ctctccagca cctgttgtt cctgactttt taatgattgc cattctaat 32760  
 ggtgtgagat ggtatctcat tgcggttttg atttgcatt ctctgatggc cagtgtgat 32820  
 gagcattttt tcatgtgtgt tttggctgca taaatgtctt cttttgagaa gtgtctgttc 32880  
 atatccttca cccacttttt gatggggttg ttttttctt gtaaatgtgt tgagttcagt 32940  
 gtagattctg gatattagcc ctttgtcaga taagcagggt gcaaaaattt tctccattc 33000  
 ttaggtttgc ctgttcaact tgatgggtgt ttcgtttgct gtgcagaagc tctttagtct 33060  
 aattagatcc catttgtcaa ttttggcttt tgttgcatt ggttttctt tacggttttt 33120  
 aagtccttgc ccatgcctat gtcctgaatg gtattgcta aatgtattt tgtataaggt 33180  
 atggttttag gtctaacatg taagtcttta atccatctg aattgattt ccagcaccat 33240  
 gtaaggaagg gatccagttt cagctttcta catatggcta gccagtttcc aaagatcaga 33300  
 ttattaaata gggaaatcct tccccattgc ttgtttttgt cagggtttgtc aagatcaga 33360  
 tagttgtaga tatgaggcat ttttctgaa tctcaataa aatactggca aaccgaatc 33420  
 agcaacacat caaaaagctt atccaccatg atcaagtggg cttcatccct ggtatacaag 33480  
 gctggttcaa catacgaaaa tcaataaatg taatccagca tataaacaga accaaagaca 33540  
 aaaaccacat gattatctca atagatgcag aaaaggcctt tgacaaaatt caacaacgct 33600  
 tcatgctaaa aacgctcaat aaattaggta ttgatgggac atatctcaaa ataataagag 33660  
 ctatctatga caaaccaca gccaatatct tactgaatgg acaaaaactg gaagcattcc 33720  
 ctttgaacac tggcacaaga cagggatgcc ctctctcacc actcctactc aacatagtgt 33780  
 tggaaagttc ggtcagggca atcagggcagg agaaggaaat aaagggcatt caattaggaa 33840  
 aagaggaagt caaattgtcc ctgtttgcag atgacatgat tgtatatcta gaaaacccca 33840



ttgtctcagc	ccaaaatctc	cttaagctga	taagcaactt	cagcaaagtc	tcaggatata	33900
aaatcaatgt	gtaaaaatca	caagcattct	tatacaccaa	caacagacag	agagccaaat	33960
catgagtgaa	ctcccattca	caattgcttc	aaagagaata	aaacacctag	gaatccaact	34020
tacaagggat	gtgaaggacc	tcttcaagga	gaactacaaa	ccacttttca	aggaaataaa	34080
agaggatata	aacaaatgga	agaacattcc	atgctaattg	gcaggaagaa	tcaatcttgt	34140
gaaaatggcc	atactgccc	aggtaattta	tagattcaat	gccatcccca	tcaagctacc	34200
aatgactttc	ttcacagaat	tggaaaaaac	cacgttaaag	ttcatatgga	acaaaaaaag	34260
agcccgcat	gccaagtcaa	tcctaagcca	aaagaacaaa	gctggaggca	tcatgctacc	34320
tgacttcaaa	ctatactaca	aggctacagt	aactaaaaa	gcatggtagt	ggtaccaaaa	34380
cagagatata	gacccatgga	acagaagaga	gcctttgaca	acttttatta	cttttttagta	34440
gtcaacaact	taagcatacc	aaaacaaaaa	taaaagacag	tcagattttg	atttgcttat	34500
caacaagata	aataatagta	tacattgtta	ttccaggctc	aggacttcca	tgaaattgta	34560
taggaggtgg	aatttcatcc	tggtcttttg	cttctccct	gcctccacc	tccctttcaa	34620
gtgctctttt	cttctccct	ttaatccctg	tgaaatcttc	tttgaaacaa	tgaatttaca	34680
tcaatgggtt	gtttttatca	ggtggctgta	gatttgggag	acacatccca	acatttaaat	34740
actaatactt	gcaaaactca	tagaaaagtg	cctaacattg	taagacttat	gtaactgctt	34800
gttaattcta	gaatgatata	acattttttc	ttctctagga	agattgctta	agtggacttg	34860
tgtcctggct	ctcacaaaat	atagtcctaa	aggaaactat	ttactcacat	ttaacaccaa	34920
actggttacc	atcatattgg	ttagctttat	gatgaagtat	aaacagttac	atgccaacat	34980
gaagaaaacc	ttccaaaaat	agtaataaaa	atcacttagt	atcacgataa	ggggcaactc	35040
cttggaatg	ataatttgca	aaatgatata	taagcgccct	tctgactttg	tgtttctgac	35100
aattataaat	tttcttgtaa	gtgcattggc	tattctttat	aattaggcct	ttacattaat	35160
tgtggcttat	tactgattaa	ctcaagtatt	tattgcaaaa	agttttctat	gttgtaatta	35220
cctctttatt	accaacgact	taaaagggca	aagacttgat	ttgcacaggg	gatctgaaac	35280
atgtaataat	actaaacaaa	agcaacttgg	gctctattga	accaaccaga	gaactaaata	35340
tgagaggccg	tgattctcaa	cacaaaacaa	ttggtcaggc	ccctaggatt	aaaactaagt	35400
ttttaaacag	gagaactctc	attaattcca	cctgaatcat	ttaactacaa	ggaaaagcag	35460
gttctttgga	tattctcatca	tttcagctag	ttgattcaat	agaataattt	catgttttgt	35520
ttctgggtgaa	aacaatggag	gtggcacaa	ttgtagagct	atgcggtcaa	actgtgttat	35580
gaatgcatta	cccaagagta	tattaatctt	ttagtggagg	agagacagac	aataagtgtg	35640
aaaaggtagt	aagactgtgg	ttatttttgt	ggcttaactt	aggagcaact	tttaatgatc	35700
acctgaaaaa	agtctaaaaat	tcttatgtct	attcttaacc	tgagtaataa	aagctataaa	35760
aatcatatata	taagtgtgct	atataaaata	tttctagaat	aataactctgt	tattaacagt	35820
tttatctctc	ttgctttatg	aaacactctt	ctcacctggc	ctagtgccat	cacattcttg	35880
gatttcccc	tttccctcc	atcccccca	tgtcaagctg	ccagctctc	tacctcttc	35940
cacctgagaa	acatgggtac	tcctcagaga	ctggcctcag	cactccattc	tccctctgca	36000
aacatgggtc	atcagtgaat	gttttcattg	tcacagttat	accattatc	actgaaccaa	36060
agactgaaat	ctccttttct	tcctgttcgc	cttttctagc	ccttatctcc	aatcagaaat	36120
ggccagaaat	gcatttcttt	gcacatcgac	ttgattttaa	ttgaatgtgt	ttaaataata	36180
tccattatcc	gtcatcctcg	gtttctcttc	ctgatgtcac	tactttggcc	aataggtaat	36240
caagattgtg	aaaccttaat	gtctgtcaac	gctaattgaca	cactatctca	aactacccaa	36300
tgacaaaatga	gcttaaaactg	ctcagtttgg	taatcagggc	cccaatatgc	cgttattgtc	36360
aaaatgactg	cactgaatag	gctttccatt	gcatgtatta	gataagagca	tagatttggg	36420
ggcctgaatt	tcattctctc	cacggtcac	agtgtcatct	cagacatatt	tttaatttcc	36480
ctgagtctcc	ctttcttctt	caataaatcg	gggatagtaa	cacccaaagt	taaggtgaat	36540
acatgaaaaa	aatgtactta	tttactttgt	ccaatgaaag	gacacagtaa	aagcagcaaa	36600
tgggtgctgg	agaacaaatg	tgatctcttc	actcgtgtcc	ttctttccat	ctgcttttcc	36660
tcctctctc	atctatgtct	aacttaccac	tcaagaggaa	ctctgctgcc	cccaccacaa	36720
cgttcagaca	agtggctctg	atcactagac	attttgcttg	cagaatttgc	tcaatcagat	36780
actgtctttt	ttcatatata	cgtgtctttt	ctattttcaa	tttatttgtg	agattttgaa	36840
agagtagttc	aacatcctaa	ttcttggcac	atcaaccaat	aaataaacac	agtagtattt	36900
actgaaaaaa	aaatcccagt	tttttttcaa	attcatatcc	agaggtccag	agggatgctt	36960
caattgtgca	gtgcccagtc	ttgatcctga	gttctccctc	atgactgact	gcaaaaacca	37020
tgacagtgtc	tgagcggaga	gatcagtgtc	tggaccttct	ccttgctctt	tcctaagtaa	37080
cataagatga	tttcatattt	gcgagctttg	aaagcatttc	agctcatgtt	tactattttc	37140
tgtctaccac	aaatattcac	agaacttcta	agagcatatt	gaaactgaag	tgtatcatct	37200
ctgattgggc	acaatatact	ctcagaatgt	attctaacat	caataaaatg	tggactcttc	37260



```

cccagcaata ctcaggaaag cctcttaggt tccggaaata aacattctgg gatgctctgc 37320
aggccagatg tgcagactgt tgagatggca ttgtgggaga gaaaagaaag aacccaagcc 37380
cattaaactt aggatattcc cagagtggct ctgcttttct ttgcgaagac 37440
atggccagca agtcctttac tctgttttc tatgtatgta cactttttgg ttgtttgtga 37500
atattgatta aataaggaag gcagaggtgt ttgggagtaa tggtctgat aggcgggtag 37560
aatgctgcac ttaaattcaa agcatttggt tgcccgttc tctctgaagc tcaatagctt 37620
ctatatctat ctcattagcc acataataga attcatcaac attttacacc actttatgtg 37680
cctgtttctc tctgaagccc agtagcttct acctgaagt tcaatagttt ctctctgaag 37740
ccaatagct tctatctcta tctcattagc cacataacag aattcatcaa aattttacac 37800
cactttacta actgtattat ttgagcaaa acactttgcc accctgagac acagtgtcct 37860
cactttctca ttgtaaaac taagaaatta ttgcagatga tatcaaagtc cccttgcat 37920
tatgattcta cattagtcac agattcatct ctaccaccac atcacagagc tctgtgggtc 37980
aaactctaata tactctcttc aatgctccaa gaaatggctg ccaaatttct ggctagtgc 38040
tgacatttca tattcacgct agtacacttt caaacacaaa ccatccctga gcctttcttt 38100
gttctttgga gatgtctgct tccgtcatcc caagaaaatg caagaacagc caaatgcagg 38160
tgtttgggta tggcctaacg actaagggtc ttgtctttt tctgtttttt tttttttttt 38220
ccagcggggg gtgagaggag ggtctgtttt aaagtacaga aaaagtcaca aaggctgatg 38280
cgaagcctta acatctactc tcgtttcctg aaattccctc tgaagtctac gggaaactctg 38340
cactctaagg gccagtcctc ataattggta aatgagaaaa tatccaaagg aacacaattt 38400
taaaagttaac aaaaaaacca taaatagaga aaaagtgatt ttgttgttgt ttgttgttgt 38460
gttagggaaa aaattggagt taaaatggca tatttatttc gttttaattt ctgggctgtc 38520
agacatcagc tctgaagccc tgattcagaa cacatgcggg gtcgctttga agttccgact 38580
gctttttttt tttttaacaa tggcagaaag atataaagaa attaaagctgc aacataatca 38640
taaaacaaaa cttctggact cctgatttgc aaactgtcat tctttcattt gttcaatgct 38700
tcattttcaa agcttcattg tggcacataa ttttttgtaa ttttttctt taagctcgac 38760
cttagctatt cttttctctc ccaaagttag gcattctact tttattttat tcaactaaa 38820
aaaaaaatag ttgtttgcgg tttctgaaa acaagaaagg aacaggaaaa tccagagcaa 38880
tatagtaaat ggaatctttt tgataaaaag catagcaata tagggtttag ctcttaaagt 38940
aaccagttct cttggcataa agacaaaaat gtaccttaaa ttttcaggca atctaaagaa 39000
aatgtctact tgggttttcat gctctactta taaaatatcc ttacagaaga ttttaggatc 39060
cttaataaaa actgtgcatt tcaaatatgg cctgacagat gccacatttg aaaacacaca 39120
tcccctacac atacagacac atgcacaaat gcgtacaaat tgatttattg ttgtcagtca 39180
gtggtcatat atctttattt gaacaagata cacaagattt tgtaatccaa ccatcccttt 39240
taaatcttaa gccacaaac aagctacaag tttcttagtc cccaaaatca tgtttctcat 39300
tctgcttttt tctataatc tcttcttggt tgtattatgt aaagtattcc aatatttata 39360
ctctttccaa atactgctat accaattcta tagtgtaact tctattccag aggttttttc 39420
tgctatatct ttaacgggtc aaatttcaaa aaattgttt ctctccagc gtaatgacct 39480
ttaatacact tacagtgcact actagtcac catcaatggt gtgctaaagc caatacatca 39540
aagttaagtg ggaaattgaa atgactatcc catcaatggt gtgctaaagc cagctcatat 39600
tgacttgcaa gaactgacag ctaaatcttc agaaatttgt gagcctgggt taaacaccat 39660
tataaatggt aaattatata aacttacaac ttaaaaatta tattagaaac aaaggcatta 39720
tgtaccccaa attcattatt tctgaattat ttactatat ttgctattat ttgtgctatg 39780
ggggttactt atgtctattg tacagataga gttgaaatac tggactatgg attgctgttg 39840
catgtcttgt ctcagctgtg ctagttaact ccacattgaa aacctgaaac gaatgaatag 39900
ccgggtggaa tgccttcgtc tgtctgggtc gctgtaacaa aataccataa actgggtagc 39960
ttacaaacaa caaagacgta tttctcatat tttctggagg tgggaagttc aagatcaagc 40020
agaagaaaat cagattgata ggagattcag tactgggtga aggccactt tctggtgcat 40080
agacagcacc ttgtcaccac gtcctcacat ggtgtgagag gcaagacagc tctcgatggc 40140
ctcttaattg agggcactaa tcccatttat ttagggtctt gccaccctca tgacctaat 40200
agctctcaaa agccctacct cctaacatta taacattggt gataagggtt taacatatca 40260
atthtgagag gacacaaaca ttcagacctt agtagtggtg atattttctt tggtttttgt 40320
ttttgtttt tgttttttaa gagctacttt ttaaatattt acctgcaaat tactaattgt 40380
cttctgtacc agaattattg aaagagctaa tttacaattt acaatgagta cttatattga 40440
atcgtggatg cttcatcctt aacttccaac tgttttttaa tccattcact gctagtcaat 40500
atattatctt tttaaattct tatcttctag ggttttaact tctcttctgc ctagaatgaa 40560
actgcatttt cacatctact gaaccacctc tcaaagcttt aatgaaaact tacatatgct 40620
gtgatgtcaa tattaattag gaaggtctgt ataagcgtcc tcttattttc tggcacaggg 40680

```

tcaggccacat ggagtgccaaa ggaaacagaa agaaaattac gcatattatt tgttttaaagg 40740  
 tgggtggaac aaattgtgta ttgctatgtc attaccttag aattttggac tgtaaatgtc 40800  
 tagaaggagg gtaccacgta tgtcaagtag cctgattcct taagtattaa ataactcatca 40860  
 gatagattgc caaacatcct ccctattctat tttgacaaca gcctacatct ataatgaaa 40920  
 aacattttgtg catcaagtag tttaaattct attattctga cttgagtgac tgtcttgaat 40980  
 acaaacagat ttttagacatg gcgaattaag atatttttat ccagaaggga tgtggaagat 41040  
 atttggataa gaactggaga aagttcaacc gtggaatta gccacgtgtt gaaaagtgtg 41100  
 cattatttat atatacttat acagcctttg ttctagtact caaaaatgct agagtcctct 41160  
 ctgacacaaa agagaaatag aaagttttta agcagagaaa atatccattt gtatgtgcta 41220  
 caactaaata gcaacgtttt cactgaaaac tcttttagttt tctaatagtt aagatcagta 41280  
 ttattttacag tgcagtgaat tactaaacac attatttaag ctctagcaga acatacattt 41340  
 caaggtgcat gagcatattc ttggtgaaat tataatacct acctctcaaa ccttctgtaa 41400  
 gtttaacaca aatctgtctt acccaaacctt ctgagtaata ggggattact ctaatttttt 41460  
 gttagaatcc ttgcgattta tgcaatttac agttgtctca tttttgtttt ttaaaattaa 41520  
 aatctgacca atatttctta atgtccatac ttttagattt tcagagcaga cgatgctttg 41580  
 atatagagaa cgtccagtg cactgtagaa tgttcagcaa tatccttggg cactaccac 41640  
 tggagtctag tgggaccttc aagttgtggc aaccacaatg tctctagata ctgccaata 41700  
 atccccagga aagcaaaatc acctccattt gagagcaact aaattaggct aattttcaga 41760  
 gaaagtggta attcaatgca taacatattt tcaaattgtt cttatttatt gataaagaaa 41820  
 acaaatttaa tattaatact tataccactt tattggatac ttttatagtt tctacagtt 41880  
 ttaaaatatt atctcatttt attctgataa aaacttaggg gttaaaggttt ttatgttcat 41940  
 tttcacagct gagaaaagtg aacataagag aggaaataac tccctaaagc tcgctcatct 42000  
 atagtgtctg tcattacata ttgataataa gatgaattga gcaagagtat ttaacaattg 42060  
 taaataccca acactggagc acccagatac gtaaagcaaa tattattcta tgtaaagaga 42120  
 gagagatatt ccaatatgaa aatagttagg gacttcaata cccactctt agcattgaac 42180  
 ggattatcta gatagaaaat ccacacagaa actttggatt taatctacac tagacctagc 42240  
 agacgtttta agaataattt atctgacaac tgcagaatac acattcttct cattagtaca 42300  
 tggaacattc tctggaatag atcatatagt aggtctacaa acaagcctca aaagattttt 42360  
 aaaaattgaa atcatatcag atattctttt tgaccacaat ggaataaaat tagaaatcaa 42420  
 taacaagagg aatttttgaa actgtacaaa tacatggata ttaacaaca tgctcctgaa 42480  
 taaccaatgg gtcaatgaag aatttaaaaa ggaaatttaa aaaattcttg gaacaaatga 42540  
 aaatagaaaa acaactcacc aaaacccatg ggatacagca aaaacagtac taagagggca 42600  
 gtttatagca ataaacaata gatttcaaat aaacaacctt acaatgcac taaaaaaaaa 42660  
 ctagaatagc aagaaaaacc aaaccccaaa ttagtaaagg taaagaata atgtttcaga 42720  
 gaagaaatga acaaaataga gacaaaaaaa tacaaaagat gaacaaaatg aaaagttttt 42780  
 aaaaataaaa gataaacaata attgacaatt agctagacta agaaaaggag acgagatcca 42840  
 aataaacaata atcagaaatg aagaagacat tacaactgac accgactata caactacatg 42900  
 acaagacatt acaactgaca ccaactatac aactatacaa caacaagaca ttacaactga 42960  
 caccaactgt acaactatgc aacaactata aaacggacac aagtataaac caacaaatta 43020  
 gaaaacctag aggaaataga tacatttctg gatacatata acctaccatg attaaaccag 43080  
 aaaaaaaaaa aaaagcctga acagaccaat aacaaataac aagatagaat cagtaataaa 43140  
 aagtctccca acaaagagaa accaagaact ggaggtcttc aaagctgaat tctaacaat 43200  
 actggaagaa taaataacac caagtcttct caaactattc caagatatta aaggggagaa 43260  
 aattcttcca aactcattct atgaggccaa tattaccctg ataataaaac caaataagga 43320  
 caaaacaaaa taagaaaact ataggctcat acccccaatg aatatagatg caaaaaaatc 43380  
 ctcaacaaaag tactagcaaa atgaatacaa aagcatatta aaaagattat acaccatgat 43440  
 caagtgatca tggatgcaag gatggttcaa cttagacaaa acaataatca aggtacatca 43500  
 cgtcaacaga ataaaagatg aaagccatac gatcatcaca atagacacag aaagagcatt 43560  
 tgaacccgca gccactgtg atgaatacta tactgaatgc tgaaagcttt ttctgtgaa 43620  
 actggaatga tacaaggatg ctaactttca ccattcttat tcaacctagt actagaagtc 43680  
 cgagtcagag caattaggca agagaaaaac ataaaaggca ttcacatggg aaaggagaaa 43740  
 gtcaaaactcc ctgcttgagc ataataat cacaataaaa gacctaaaga atccatcaaa 43800  
 gaattccttg aattgacaaa ttcagtaaag ttacaagata caaaaatcaac ctacaaaaaa 43860  
 tcagtaatct ttctgtatca caatagttag ctacctgaaa aagaaatcaa gaaagcaatc 43920  
 caatgggcaa tagcttcaaa aatatatgag aaaatattta accaaggagg tcaaagattt 43980  
 ctatgatgaa aactgtaaaa cactgatgaa ataaattgaa gaagacacag aaagtaaaaa 44040  
 acatcccatg tttatgaatt ggtatgaatta atattgttaa aatagccttg ttacccaaag 44100

caatctacag attaaatgca atccctatca agttaatgta aagatgtaaa gagagagatt 44160  
 gatcccaata caacaatagt tggggacttc aacacccac tctctcagca ttggacagat 44220  
 catctaggta gaaatatcat tctctgcaca aataaaaaaa atcctaaaat ttgtatgaaa 44280  
 ccacaaaaga ccccaaatag ccaaagagtc ctgagcaaaa aacccacaa aaaaaacgaa 44340  
 agctaaaagc atcaaaactac ctgacctcaa aatatactac aagcctataa taaccaacat 44400  
 atcttggcag tggcataaaa acagacacat agatcagtgg aatagaagag aggaccaga 44460  
 ataagccac atatatagag tcaactgatt tctgacaaaa gtagcaagaa catacgttgg 44520  
 ggaagggaca gtctccgcat catgcaatat atccatgcaa tgaacctgca catagtatgt 44580  
 aatgaatcta aaatttaaaa aatagataaa tagtgctggg aaaactgaat atccatatga 44640  
 agaacaatga aactagactc ccactctca ccatatacaa aattcaactt aaaatggatt 44700  
 aattacttaa atggaacacc cacaactacg aaactactaa aagaaaacat aggggaaatg 44760  
 ctttgggaca ttcagctggg caagaacttt atggataagg cttcaaacac caggcaacaa 44820  
 aagcaaaaat aaaacaatga aataatatca tactagaaag ctgcagagca aagaaaacaa 44880  
 tcaacaaagt gaaaagacaa cttgtagaat ggaagacaat gtttgtaaac tattaattaa 44940  
 ttaatttcca gaatatatat acaaggaacc caaacaactc atcagcaaaa taaaaccaa 45000  
 taatctgatt taaaaatgga caattgatca gaataatcat ttcttaaaag aagacatacg 45060  
 aatggctaac aggcataatga aaatatctc aacctcccta atcatcagga aaatgcaagt 45120  
 caaatccaca atgagatctt gcttcacccc ggtagaatg gctattatga aaaagacaaa 45180  
 caataactag tgctggtgag gatgtagaga aaaatgaact cttatacact gttcatggga 45240  
 atataaatta gtacagccag tatggagggt cctcaaaaag ccaaaaatag aatgactgta 45300  
 tgctccagcc atctcacac tgtgtgtata tccaaaggaa ggaatcaat gtgttgaggg 45360  
 aatatctgca cttttgtatt tattgcagta ctattcaca tagccaagat atggaatcaa 45420  
 cctatgtgtc cattaatgga tgaatggata gagaaaatgt ggtataaata gacaatggaa 45480  
 tcttatacaa ccattaaac agaatgaaag aatgaaaatt tttttgtca tttgtggctc 45540  
 tagatgagcc aagagaacat tatgttaagt aaaataatgc aggcacaaa aaaataaata 45600  
 ccgcacaatc tcacttacat gtggaagcca aaagagttga tgtcatggaa gtagagagta 45660  
 gaatagtgtt taccagaagt tgggaagtga gtggagagag ggagaaatag gaaaagggtg 45720  
 gttaatagat acaaaattac aggtagatag gaggaatacc ttctagcgtt ttacaacact 45780  
 gtagagtgc tacagttaac aacaatttat tctgttttcc aatagctaga agaagggtt 45840  
 ttgaatgttc ccatacaaaa gaaatgataa gcgttgagg tgatggatat gttaatttaa 45900  
 taatcacaca ttgatttaat cattacacac ttagagatg tatcaaaata ttactctgta 45960  
 ccataatacc atgtacaatt atgtgtcaat taaaattttt tttaaagagt acaagaata 46020  
 aaaaaattaa gctctgaata cataaggca ctataattga tgtggctggg agcttctata 46080  
 ttatgcttat ttctagaata ttaattgttt taaagaatat gcataatttg agacatttca 46140  
 tgtctcaaat taactaacta ttccatgtga catttaaaaa tggccatat aaagtgtttt 46200  
 tctactatat tgtaagaggc agtataataa atgatgcctt ttcttttaga ataaaacatt 46260  
 ctatcctgga aaaatcactg taaaaatggc taaatacatg atatatacat agtatgtgta 46320  
 cagaataaaa tacattatga tgataccaga ggtataaatt taatcagatc caattctagg 46380  
 ggagtggctc cgtttcaaac ttctgcataat ggataatgct acaaatgacc agacattcta 46440  
 agaattactc tcaagatgtc actaccctaa caaaagtaaa gtaaactgta agaattggctc 46500  
 atgctctctc aagtttgccc tttggtgagt tttgttttct ttccagaatt atctgattgt 46560  
 gcattattgg ttgtagata cagaggatta taggtccaac tttgccaag gaattatcta 46620  
 gctatagctc caaagccctg tggcccttc cagaaagcct gtggtccttc ctttgacctt 46680  
 ttggcaaat ttgcttgta aataatatga catcacaaaa tctgcaggga attcttacac 46740  
 tagcaataag gctcaactag gaataaagct aggtgatata atcttgacat gcatcatagc 46800  
 atcttataat gtgcccctc ttaaaaagtc attgtaaaac aaacttcac actcgtgaat 46860  
 taagtaattt agaattccca ttctagctca tctagtgaac aatgtgttta acagttgttc 46920  
 tgggcattgt tctatttcac ttgggaaata tttttcaaat cacagaattc cattgattta 46980  
 tgtgagactc tcccttctct tctacattga gctaaattgt ttccattca aacagaatta 47040  
 taaagaaaaa atacacctt ccattgctctg catgggacaa catcctgcag gattgactcc 47100  
 taccctcgag atcatttggg ttttaattgca ggtgggttcc atagtgcctc cttgtgggtt 47160  
 ctatgctttt ggatgcactt gcagctgggt tcttcttttc ttgtgagggt gctcccgatg 47220  
 tgaaaagaga gatcttctt ccactttgtg ttttctctt cccaagtat acttccaaac 47280  
 tgtgtacct ccagcacagg agtttctgga gaatcacagg tttaaatcag ggctttccag 47340  
 ggcttaaaaa ctttatgaaa agtgcagtg actcatggcc atatcagctg ttatcacatt 47400  
 ccttttgcga gtggctctcg aaattgattg tgtgtgtatt gaataaagaa cagggtgatt 47460  
 gtaatctcta gctgttaaga caaggaatct gcattttaa caagactgct cagggttagtt 47520

gaatctatatt gtaggaggcc gtcaacaag gtcttcagag tcactgctgt atattttctg 47580  
 gagctgtgaa ggagcaaata aactgggctt cctttgccac tgttgcatcc tgtaatctct 47640  
 ttaccatcat tttccccacc atagatcctc tacaactctt atttcatgca tttgtagcag 47700  
 ggcagaaaac tatattatct taacaactca aaatgtttct tggcagagga actatctgta 47760  
 cttagaaaaa gacatttata tctgtattta gaaaaagaca tttggcaaca tggctcacgt 47820  
 ctgtaatccc agcactttgg gaggccgagg caggtggatc acctgaggta aggagttaa 47880  
 gaccagcttg cccaacatgg tgaaaccctg tctctactaa aaatacaaaa attagccagg 47940  
 catggtggca agtgccctga atcccagcta cttggggaggc taaggcagga gaatcacttg 48000  
 agcctgggag gcgctctaggt tacagttagt tgagattgtg ccactacact ccagcctgcc 48060  
 tgggagatag agtgagactc catctcaaga aaaaaataaa cgttaaaaaa aaaaggaaaa 48120  
 agacatttga aagtgaagaa ttagaagcag aggttatggg tcaatgagac aaagcaaaag 48180  
 gagagaaaag aaaggataga aaagagagag agaaagaaag caaaaagaaa gaaaaataa 48240  
 agagagagag agaaggaagg aaggagagaa ggaaggaagg aaggaatgaa ggaagaaaag 48300  
 aggagaaaag aaagaaagat gagaaagaaa agaaagaaaa gaaggaaaag aaaggaaaag 48360  
 aggaaaaaga aggaaagaaa gaaagaaaag aactattcag cattagaaat aactataaaa 48420  
 cttgatgagg gagaaggaaag aaggagtgcg agtgctaagt aatatgttaa gaggtttag 48480  
 tttaaaatgc acagatggct gaaatacttc tagaaattgg aatgttacat ttctgtctca 48540  
 tctgcaatgg aaatcccttc catttccctg catacaataa atgctttcat acacaaaaac 48600  
 ttgcagggtt gtttcttcat gaaaacattt taaaagggtt taattttaca ttagcattga 48660  
 tattatgcaa tgtaaaaatg gcaactgtga gctgtggcaa taacttttaa cataaagtta 48720  
 ttaagaggaa gcaggcacac agagctacaa cattcaagaa actataagta tcacactatc 48780  
 ctcaccacct cacttgtaca atcttaagta gaaaaatgga ctttcaaaaa tctacgtgaa 48840  
 gaagctttga atttagctta tctagcttct gagggacaac attgtcttaa tgaacatcta 48900  
 ctctgtataa aatgccttat taaaccttca agtgccctgca ggctggtaag agatatatgg 48960  
 caaggccaca gcttacaaca gcaaaaaaag aagttagcaa caagagggat tctgacagtg 49020  
 tcatgagtgg ttaacaagaa atggggaggc tggggcgggc gcagtggctc acgcctgtaa 49080  
 tcccagcact ttgggaggcc aaggcgggtg gatcacttga ggcaagagt ttgagaccaa 49140  
 cctggccaac atggtcaggt tgctaaaaaa ccaaaaatga cccttgaacc ctggaggcgg 49200  
 accgtaggcc cagctactca ggaggctaaa gcagtagaat cccttgaacc ctggaggcgg 49260  
 atgttgtagt gagtggacat cccgccactg aactccagcc tgggcaatag accaagactt 49320  
 tgagaaaaaa caaaacaaaa caaactagtt aaaaaaaaga aaagaagtgg ccgggcacgg 49380  
 cggtcatgc ctgtaatccc agcactttgg gaggccgagg cgggcggatc acgaggtcag 49440  
 gagatcgaga ccatcctggc taacatggtg aaacctcgtc tctactaaaa atacaaaaaa 49500  
 ttagccgggc gtggtggcgg ttgectgtag tcccagctac tcggaaggct gaggcaggag 49560  
 aatggcgtga acccgggagg cggagcttgc agtgagcggg aaaaaaaaaa gaaatgggga 49620  
 ctgggagaca gcgagactcc atctaaaaaa aggatctagc aagtaggaaa ctcatgatg 49680  
 gggtagaggg ttccccatta acttatgctg agatcttagc aatgtttta taacaaatc atccctgtg 49740  
 aaataagcca atgcaatatt ttatggatct aaatgtttta taacaaatc atccctgtg 49800  
 catatttcca tatagatttt aacttttatg agatttgaga gcacatctta tgtcacacac 49860  
 actttatcat tacagtggca acgcagcacc ctgatcatca tagataatct gtgaattctt 49920  
 tcacctggta gcagcatttt tttaaatcct cttttataa catggttggg ctgggaagaa 49980  
 gaatgtatct ctcataatta 50000  
 50001 ttttctactt ttattgtatg aatatgtaaa gcagaaaacc  
 50041 ttactatttc agtaaatca tacttggcac taaagtagaa agtaaaacttt atctacttaa  
 50101 aagaaatcgg gaaaatacat atttttaatc caaggaatgc taaagctcgt acttgttcca  
 50161 attgttgggt gtttggggaa ggacaggaat tgtgtgtatt gtaattatga ctatcgaac  
 50221 tacagacttc catcagaatc tctgttccca atcgtagcca gcattattct catcctagat  
 50281 ttgttgccag ttgtgtaagg gtcagtgtga ggtgaacaga atatgaggtg tctggctcca  
 50341 attccatttg gaacattaaa gtgactccag attgataaaa tagagagaga gaacagcatg  
 50401 cttgactaca aagatcctaa gccagagtga gccaaatggt acattctcga ctaacgggtg  
 50461 ctaacaaatga aagagagaag agatcttagg agtggaattg aagcttcatt ttatcagggc  
 50521 ttacttttag atgtaggtag aataaatgag aatgtttgtc agaaagatag tgaggagtaa  
 50581 atgggcgtaa atagctgaca caaagataag aaagctgtca acattttctg caagggtatg  
 50641 aaaattcacc ttttcagggt cacatgctgg ctgccagtga aacgatggtg aaaaagagtt  
 50701 aaggaagcta aaaacagaaa ctctagggtat ggccctcaga aaggaattcc aggaattcc  
 50761 actggatgtc tatttgaaag attgacaaga ggaaggatat gtaataaaga agtcaaaaaa  
 50821 gatgaaaatg gattaaaact tgaaaggatt attaccgatt ccctgatttt ggtctaacac

50881 cattgcttag gcgccacaca agtatatttac gtaaaactatg aataaaatgc agttgtcatc  
50941 tatgtttttac aaatgagaaa actgggattt aaaaaaatta acaacttgcc taaagtcatg  
51001 ttattgctta gaagggccaa gtcaggaccc aaatgcaggt ttatttagtt ccacagccct  
51061 tgctatagtt aaccatcagg ctgaaattcc atcattttctc aaagcacctc ctttctccta  
51121 ctctgatcaa acatgtattc tctggcctga acatgtaaaa ttgttttcaa attgctcatg  
51181 caagaaaatt gctgaatata tttgttcata tccccctaca taactgtgta tcatgcttta  
51241 ttatatcaga ctgactagct ctgcacaatt ggttttgctt accccttagc acaatgccat  
51301 atgtaataaa atactattac tatagatgat tatactcatt agaaaacact caaaggaacg  
51361 agactgcaga gattcctgga atcagaaaaa ttgtacatgt aaactagaga catatttcac  
51421 ttataaatag tgtgaaattt ctttttccaa acttttccat tctcagata ttaaaatcaa  
51481 aagtgttctt tatttgttta tgtgctaatt caaatacgta gctaaataat tatatttttag  
51541 gaaatccaac aagatatcct gaggttaagca tatttttatt tatttcagtg atgcagttca  
51601 ttcaatcatt tccccctgcc cttgtcaatt gtttcagttg ctcacaggca attctattag  
51661 aaataaaaata ttgttagagg ggggttctcaa aactgcttta tcttcattat attgaaaatt  
51721 ctattccaaa cgaatctttg gggaaatctt ttttactcac atacttttct ttcatagttt  
51781 ggtttccaaac acagagagtt attcctgcc aagcctcatt tttctcctt ttttttggt  
51841 aaaagcaatc ttctggagcc tgttcattcc cctaccctc cacagatctc accatgatga  
51901 ctctcctaag gacacattag agggctttgc cctaatecat attttactaa acagccccag  
51961 gagtgagaag aaccttcact aggttttgat taaacaaatt cttaaagcca ataaaaagtt  
52021 ttcaagttgt aagagaaagc agcatttagt catgttccca agcagggcag acatttcact  
52081 gttgtcatcc ttaaggaaga cagtttggga tgcagtacat tctccctgag actcattcca  
52141 gaggttccag cctccagcaa cagtgtcctg tgagggtagc tttattgcat agcacaatgc  
52201 agttgtgact gaagctgttt ccaaacactt tagggcaatt tcatgtgtaa ctttctctct  
52261 gccactttac agggttcctg aaagggtaga agaaaataca gtaggttaagg ccagacaaaa  
52321 cttgtgacta aattgaatct ggcataaaaa aataatatga catactcttg ggacaaaata  
52381 aaaagaaagc tgcttgttaa atgcagtaga ttagaaatgt atatatgcag atgtgaacat  
52441 ttaaaagatt aaaaatactg gactgatata tggaaacaac ttttatgatt aaataagata  
52501 agttatgaaa acaatcctat tggatgttca ggaaatgttt aaaacgaacc aagtgggttg  
52561 agatatagtt ggttcatggc catatttata tgtggtaaaa taccatact atacaatgag  
52621 gtttaagtcta gcaattatgt gggttaatttg gtcactctcc ataactatag agattcattt  
52681 gttgggggtg ggatccccta caggcatggg attctcccag ttgactggta ataatacaa  
52741 acaggcttac cagaaacaaa cagttgttaa gtctccacta tattacgtgt tcaattgatg  
52801 cagttgaaat atcaaaccta gcttttcttt tccctaattg cagcaatgca gacaaataac  
52861 aggcgttttg aaaaaagagg atttttttta actctgagat attttaattc tgtcccagca  
52921 gagagtcaaa gaatcacagg aacaaaatat attattcata caattttata tatatatata  
52981 tgtatatgta tatatgtgtg tgtgtgtgtg tgtgtgtgtg tatatatata tatatgtata  
53041 tatagtatat atacagagag agaaagagag tctgatctgt tgcagtattg gagecttggg  
53101 aataaagtat ctttttggga atctctgtag tatattatta gaagatcatg attaatgtca  
53161 caggacttaa gcaatctttg aaaagaagtc aaaatgtgcc acaaaaattc acttgattgt  
53221 gccagtggga atatttccta acatagtcct aaacttcaaa aacagtataa agcatgcaaa  
53281 tggagtaagg ggcgggggtcc atccatttct tcccagtat atttaacta tttacagaa  
53341 aaatgttggg aaagtgtgtg ctcttattag catgagaaaa gggcatccag tggatctat  
53401 acactagact gttcacatgt tgtttttccc agggtagggg tggattcgt acttcttatt  
53461 gctttatgtc accagtctgt aaccagatt tttttatggg ggcagttct gaatcctcag ggaatagaa  
53521 cagataaaca gccatttatg gctccctgct agactatcaa ggggtccatg ggaatctgtc  
53581 gatattggct aaagtttgtg gctccctgct cataatggta ttctcacact gccttcttgg  
53641 cggactatga ctttaagcaa acacctctct ctaaatggta ttctcacact gcaataaacc ttaatatagc  
53701 ccatggactt caaaagctga ttgcaggag ggccagaaaag gcaataaacc gctctctgag ttggcatttg  
53761 aggactagcc tagaggggac agacagggca aaggtaaggc gctctctgag ttggcatttg  
53821 tgtgttttagc cacatggggg gattaagggc catctgttct tcagtgggct aaatcatcgt  
53881 tttcacagca tcccaggatc aagtacatt catgcttaga aagcatgaa aagcacccta  
53941 gagttttccc agtcctaag ttagtgtgtg tgcacctgtg tgcgcagtga tagatttgag  
54001 tgatagtatg cataggtgca ttagtgtgtg cacaattaaa gcaaaaattc tgtatgtatt  
54061 ttgtttttgt agacttgaaa ttaagagtat ctggaatgtt atgtgtatag aagtcttgtg  
54121 catacatctt ttggacaggg aaaaaaacct ctggaatgtt atgtgtatag aagtcttgtg  
54181 tttgttttga atatatcgtg tgaccagttc atttttttt aaattagaga aactccttgt  
54241 ttgaaatcca tgtacagaga aatctatcat ctttctgtgt gtgtattatc aagtctttca

54301 aacaacactt tatttcagaa aatgcacatt atcaatttgt gagaatagaa atttgaattt  
54361 ttctgatagt atttccacac tgaagataat ttttttatat tacagggtcac agatagtagt  
54421 aagcttggtta aaagtttagat gtgatttagt tggatatcca tctttatcca tactactagg  
54481 gctatataac cctagttata taacaaatta cactgataat ttgttaaata acaaatata  
54541 ttgaatagtt caaggcttat agatttttaa agactgtatc attaactcac tgtattcaca  
54601 ttattttataa ggtaagctaa ccaccatgtc ttccaaagaa ataattaata tactattaat  
54661 tttactgga ctaaaccaaa tgattaaaat ctgtagattc tgaatctata aaatttttga  
54721 agtacgatct atttaattgt tacatagttg aaacttacta ttggcaatcg acagtcttcc  
54781 atcatgtcaa catctttaac atgatctagc ctaggttgtc agattcttca tcaatctcag  
54841 aaaagataat aaaaaagaag acatcaagtt catgtttggc tataggggaga gcaagtaact  
54901 ttcagggaaa aaaaaaatta taccagtaca tcagggtgagt aaactcagtc ctactaatta  
54961 ctagttacca cataggagct cacttcaaat ctaagcacta caagaaaagt gtcctctatt  
55021 gacaagacac ccaaacagca tttttattaa tagggacgac agtctagctg tcattccaaa  
55081 gttatgtttt caatcagcca aaccatagca aatatatcct aacattaaaa catgtttttt  
55141 cattaataac agtttgctta gtggagattc caaacctaa gccatacttt ggaaactttc  
55201 cctatgcaat aacttcttaa ctcagcaatc ttcatacttt ttggtagcat aagcgtaaca  
55261 gaatttgaaa aactatatac cttcttctgt cttttaaggg gatgtctaat atttttatga  
55321 gttagtattt cttaaaggat atacttttaa gcatattgtg taagtgtatt aaaaacattt  
55381 cctcaaaata ttggacctct ggatttagct gattcaattt atggaaaagt tccactatgc  
55441 aatcagatag acaataccag tcttcttctg cacaccaatc aactaaatca gactcactta  
55501 taaaaaaaaa gtcttatect ttttttccat tcaaatgttg taaatgtgaa ttccaacata  
55561 agcagactga tgatcaatgg atagataagt aagtagatat atatacagta aacacccttt  
55621 ctctgagtac ataccctttc tctgagtttg taacttagat aaaatgagat actgcctctc  
55681 tcaatatttc tttataaaac tcacagtatt ttgtggtcaa aggaaacgcc ttcagaaata  
55741 atatgttctc ttaattactc tccttcacat acctcaaaaca ctattaacat gaggccactc  
55801 attatttttc tgaaaatata acatgctttt agaattttta aaatatttat gtaaaaaatt  
55861 ttttagctatt tgttccattt ggctgtgtac cactcatctt tttatgccat atacaagtta  
55921 cettgtcagt gaggtcttta ctcaaccagg taactctgat tacttcttca tctatgttcc  
55981 catagaatat tattttacaa atatatgtc ataattgtgt atgtgtctgt cttaatagac  
56041 tatgaatgct tcccgaatgt taaaaactca ataaatgttt taaaaaaaaa caaataaatc  
56101 aatgaatgat tcaatcatta agaaataatt ccaccaagaa atgtctaaaaa tgggtcttta  
56161 caaggtcagt tgccatgtat gactttatgg tccagaggag atgattaaag aaatgtgtga  
56221 aatatatttt actattcatg catatacaaa aatgtatttg ttctgaaga gattgactta  
56281 tagggaaacat tttaaaagtg acagtaaaaa actgtgtcta gaaagatcac acatggacac  
56341 gatattttaa agcattggat ccattgcattg ttcctgtgtg gcaaagaccc ttagctgaaa  
56401 tggagggatt tttttttttt tttttaagta accatatttt aaaagagcaa ttagatagag  
56461 aaaaacataac atttgtttta taaccacttt taaaacttca ttatactcat tctacacata  
56521 taatgagtag caaataaaat ctttaagtag actccaattc ttaaaatatt atgtagagaa  
56581 ttatagccca ttattcaccc ttttaggttg ccaaatacag cagtttagca agatcttctc  
56641 cagtaaaaca tggttgaatt gatatgacct acaaatatga ttattagata ttctgcagaa  
56701 aaaggtagca gagcaaacag gaaggatcag aaacctccgc atagcattct ttaaacattt  
56761 tttagtaaat tgtaacactg cattttagga gtcacattat ttttatttat tatcttatag  
56821 ctatattcta agaaaacaaa ggaaaaagtt ataaagtcct agagttttga caaatcataa  
56881 attcttccaa gtctttgttt agattttcga gaattattca ataagcgatc atttgaaagg  
56941 ctttattacc ttttcttcaa aagtcactct taaatcagat gtacacattt ctttaaccaca  
57001 ctctgttaca aataattatg tagaaaaatg tcagtaaagc tttttctgaa aaatcagtc  
57061 agaccagatt ttttcagcca ttattttccc caaatttaat taaatttttt ttctattttt  
57121 aaaatttatt atattcagga aattcaagga agatataggt tgtggtttta aactagaaaa  
57181 aatgagcata tgcatactct agacttaagt aatacatatt gctaaatcct ttacaatgtc  
57241 attgtatgca gaagtagttc aaaacacctt atttttctgt gttcatgttt atggctctcag  
57301 gaattgagaa tgaattttcc tcagtggaaa atttagagtt tatttacctt cactatttct  
57361 ccatagatac ccattgtagt aaaagtcca acagtggaaat ttgcagtgtg aagggaattgg  
57421 gtctgagaca atgttcttgc tagttctcta acaagccagg tccacaggag tggcgtgtga  
57481 cccgatgtca ctatctttaa caaaatggct tttgcacaaa aagaaagacc tttataccta  
57541 aaaaataaaat cttataacac attgttataa ttatttagtc tggcatggag ttttattaag  
57601 ctttgtgtta ttcatgaggg acaagaaga tcatgcccaa gaatgaaaaa gaaaacactt  
57661 aatgggggtct gggcagtttt aacagcataa gtgaaatata acaccaaaaca ggatgtctct

57721 cttcctttga acttgaggca ttccatagac cctaagctac tgaattctct ggtagttat  
 57781 gtggtgccag acattcagtg gcacttaatg aagataagtt tctacctgt gcttttaag  
 57841 gtaatggtga atgaatcctg cctgaccaaa ttgagtggtt cttaaagtt actgtaaagt  
 57901 tggaaaaaat ataatatatt ttcttggtct ttaaagtgat tagtctcttt tctatgtttt  
 57961 tatgatcaaa tgctaataaa tcttcaaatt agtaagcaga aatatttcta tatttttatc  
 58021 ttaagcata> atataaatat ttgtccattt ttgaaacata aataagactc taatggaaaa  
 58081 taaaattttac atttaaactg caacagatca tatttcataa aatagtttct tccttcataa  
 58141 ataacacttg gaattttaatg tacattagga aaagtatctt cttgatgttt cccttcggca  
 58201 ttaatgaaaa ctgcagctgc tcctttttga gattttcttg attatccaaa taaacaaatg  
 58261 ttttctttat gcttgtaga tcaaggaaata caaaatccac acctaagaaa ctgctacctc  
 58321 tcccttttgg aaatatgtcc atttaaaaag tggttaatca tgattaaata atgacttatt  
 58381 gttactaagc tgcatttcaa gtctctaaac agggaaactc tggaaattga gtataacaag  
 58441 aagcttaag cctcagatca aatgcgaact ccaactgtct aacctacaa gagaatagac  
 58501 agccaaagag agctgttcga tgctaaggga aacatgctgc cctgctgttt tttattttta  
 58561 aatctcagca ttaactgaaa gtatcaagtc aaaactttct tctttcataa aaagataaca  
 58621 ctcatttca aaggaggagt acactcacct aataagaatt taaagtact cactcatga  
 58681 gctgatcttt agaattagat ttagtgactc acttttgtta tcatgtctc gtccttttga  
 58741 ttaacaaaaa tcagaactct ttcatactat caattccaag catcctctc tcttattatc  
 58801 acctctagc ttttcaattt actctcttta ctgccacact gcagtatttc taggatctac  
 58861 aatccattga tcttaccat ttttcatttc tcttataatc tacattgtct cactttcctt  
 58921 ttaaacagct ttaaaatcct tagtacatca gataatcact tgtctctttt actctaaact  
 58981 aatcctggtt acatccagct ctctgcctag cggggcctga gccctatcga atatggctgg  
 59041 tgaaatggta ttgttatttg acatagttat tctgactggt ctcactttta agttatatgt  
 59101 gaaatttaca tgggctcata agttgttcta agctattttc cgctagtaga tccccttttt  
 59161 cactcctgta gataattatg ccataacttc tctcatgttt tcaagcctcc aaaatgttct  
 59221 tgcccattcg aattctcagt gattaccttt gtctctgttt cactgagaaa aaagtcagaa  
 59281 gcacacttca tatatctccc accattacac ccatacctg ccagcatctg gaccacata  
 59341 ctctgctttt tcaactgtct ctgtggataa attctcctgt atctaagccc aagccttcta  
 59401 cctgtgtcct agaactcaat tctttcacia attcaagaac atttgtatag caattctctc  
 59461 ttctttttac agcagcatca attttccctc tctactagaa gatgaccagc atcacataaa  
 59521 tatgtgttca ttttattaag attatttttt caagtaactc tcagaccctt tctcctctct  
 59581 acctactgct ccattgatct cttccccgtt agaataaaat tctcagagag cagcagctta  
 59641 tatgtgcagt ctacaatttc tctctccaa tttctctct aatcaggctt ttaactcatc  
 59701 aaactcctta tcttgtctag gtcagaagt gctgcagat tactgaatct agtggtcagt  
 59761 ttttatctta ctgaccctt taaggacatt tgatagagct aatggcttgt gtcctctttt  
 59821 gaacggcttg cctccatttg gctacaggac agcacactct gccagtgaat atcaatcagg  
 59881 cttcatatgg ctccccctca tggctccaat gtcataatgt tagagtgtcc caagcaacag  
 59941 tctttgcate tcttttctac ctacacttgt tccctaggtg atctcatctg ggcttacggc  
 60001 tttaaatagc gtctatatgc tgataacaac taaatttaac tctcagctta aaccttttct  
 60061 cacatctttc cccatttcag ttcagagcca ctcatctct tctggtgccc agacccaaaa  
 60121 cctggaagtc atcctttact ccattccac cttctgatct tctctcatac ccaatccagc  
 60181 ctgccagcaa atccagttca ctacacttta aaataaatca aactatgact acttttcccc  
 60241 acttctatca cctttttctc ttgaacatct catacttgcc ttcttcttcc tttggcactg  
 60301 tgggcttggt cctgcctcag ggctattgac ctttctgttc cccatgccta caatgttctt  
 60361 cctatgata gtttcacagc ttgtccttt atcaccttca gctcttcagg caaacatcat  
 60421 ttataagtga ggccatttct gatcacctt ttaaaaatca caaacctccc ttgtccagc  
 60481 aaaatctgac cctttccctg cgttcatttt attcatgaac tccaatgta ctctatgttt  
 60541 gcttacttat tttgcttagg ctttaaccac tagacaatgc tccccaaaag aactttcagt  
 60601 gacgatgcaa atgttctata tctgcaatgt ccattgtgga agctgctagc tgtgaatggc  
 60661 tattgggcag ttgaaatata tagtttcatt aagttaaatt taaataacca tatggccagg  
 60721 gagtaccatt ttagacagca cagtttaaat ataagccaca tgcaaacagg gagttttgac  
 60781 ttcttcagac tgatgtagct ccagcactag atgctgatg tatacctgtg aattgaatta  
 60841 gtcactttct tttctttctg gttttatttc tctggttgaa tattgcccc ggccatggta  
 60901 tttggttgat aaggagagcg aaggttatgt tatgttctt cacgtgctg ccccttgtgt  
 60961 aaagcacaaa ctacacaact acaggtttgt accctgagta acttggtttt gcagatctcc  
 61021 ctgtagctta cgggtttacag cttctctct gctttttgac actactgtca ccatcaatat  
 61081 gaaaagaacg ttaggggtac agtgagagag ctctagatat gaagggtgtt gcatgtctgt



```

61141 tcttctcact gctgtaatga caaaagcact taggggtctt ttcttttctt tttttttttt
61201 tttttttttt ggcctattac ctacttgaaa cactgtataa gctctcaaca cagctgcaga
61261 aggaaggcca aatatgagaa gcaacaagta acaacctggg aggaaaaaaa aatgatctga
61321 cataaactta agttccttaa actcagtatt aattaatgct agaataataa tcacatctct
61381 ctatcaagaa agaagtttca tcagctctac atggggtaga ttttaattgca ttttatgtct
61441 gggacaaaaa caaatatacc ttcttgagcc ttcttaaaaa ttatccttta ataaagcatc ataagagaat
61501 cttttcccac ttgtattgc ttcttaaaaa ttatccttta ataaagcatc ataagagaat
61561 agatacacga ggaaccaaat ttacctcttt ccgtctttgc agggcagggc tcaagacctt
61621 acagtggag agttatgctc tccataaaca atatgacctt ccaggagaga agaaagaata
61681 gcggtaaagga cagagaggga gagagactgc ctctctttgt tttgaaggtc aatttctgat
61741 ataaatgtag acagaaagta tattccacta gctctgatgc cagaccacct gtgaattcca
61801 tctctagctc ttccataaat ttgacctttt cttatctttt ttatgcttta gtttcttcat
61861 ctataaaatg aggatcatgt tgatattgtt taattgattt aaacacgttt taaatgttcg tagctcttga
61921 agtaaatgca atgtgcttac tattgattat aaacacgttt taaatgttcg tagctcttga
61981 tattctagat agagaatttt aaaccattgt atgagttggg ccaataactt cattttccag
62041 atgacgactg aagacatcaa ttcttcaaat agatacttcg tgtctgtaga acgcagggtct
62101 cctatttctt agtttgtgtt tcttccaata aactccttga aagctcacta tttcccttca
62161 ttctttttca ttcttttctt gattgttaca tggggagtaaa tgaagtaatc agagcttgga
62221 aataagtggt aattgtgctt ttgggtgcaa gtaaaaaaatt acttatttta ctctccaaga
62281 tttatttttt atttttattt ttacctaca tgggtgtcat caaatagata agctggatct
62341 aatcaaatag atcaccccca gagggaaatga atccattcat acaaagacct gccaggctgt
62401 ttgacactag tatctctgtc ctatgtgtcc tatgtggaag gtgggtctag ggctgccctt
62461 aaatagatgt gaatagtgtg gacttttcag gttccaagtt gatgaaactt ccaaaccctt
62521 ggtgatctat tgggattgaa agttgattac aactttccca ttgctaaata tctgaacacc
62581 acctcaagtc agtcacacaa ggagctaggg ccccaagcac cctggaaaga ctaagaagcc
62641 agacttgcca ccataccttag gctattactt tggcctggta cttactagct ctttaagctg
62701 gtactcaatg atttactgtt caagtgcctg cagtggttct tcctaattgc tgatctcatt
62761 ttgcacccaa gtgcacaaata gtcccctgga gactactgag taaaacaaca ggaaaagtct
62821 taataacctt caggatcctt agtaaaatgc agctcttaaa gtagaggacc ttcttggaac
62881 catcccaagt agcctgacac tcctgttttc tttaggcact tcactgtgctt gtcagttact
62941 gaaattaact acatttcata aatgattccc tctgctggct acttgggcga caaagtgggt
63001 ttagggactc actttattta catgattacc ctaaggcagg aaggaaatat tgtgcataag
63061 gaaagtgtctg tggggagaaa tctttgacta aagagtaaca acatctgaga aaactgttta
63121 tagtagatcc agaaaagtgc aaacaaatga acagagctgg cagctcattc tgaatctgag
63181 ataagcaatt ctaaatgaga cagctggatt ttatatagcg cacaaatagc tgctatgaaa
63241 cccagatcag acagactcgc caaaatatcc tagactgctg gaggtcagta caggtcagct
63301 aaataaatta aatcctgagt acactacctt ggtctaattg cctggtctct ctgggcttac
63361 ctttgtcttt tcatcactag ctccacctat cctttcatct attttctact ttcgcttaaa
63421 gtttatatta cggtgccatc aaagataagt ttctatgtta cagcccaaaa gtaaatatta
63481 atacttctat gttacactgt agtgaatttc ctttttagtt taaaaaatct gcttttcaaa
63541 aggtaatcga ccacaatgga tgtggtataa ttccaatcat caacagaaac gttccctctg
63601 tttcattctt tgtatttate ttgagcagca taaactcttc tttcccatat atgaaaatct
63661 ttgaaatgtt tatggaaatg cttactaaat gaagaagttt gctaaatgtc ccaaataatta
63721 ttaaacctgt actattttac tgtgcttggc tatcaaaact gactccttgt tacatagatg
63781 tctgggagag tcatcctatg ggcagatctc caaaactctc caaaacaaat ctccaaaact
63841 ctatgactcg tgtattgtag acttttggtg gttgtctcatt acagcagttt tcatctgtta
63901 ggtggtttga agcattttaa agtcagatag ttatatgctg ctatgcaggc attaaagatg ttataatcca
63961 aactgttcaa ctgtcatgca ttaagagttg ctatgcaggc attaaagatg ttataatcca
64021 gagctctttt gaggcacatg gacatgataa gactatctaa tattggctaa catttgttga
64081 gtgcttgcta aatgtcaggc tttaggctga gatgtttaaa tgagtttctg tatttactct
64141 tcataaatct atgagatata gtcctatttg catatgagga aattaaggcc cactaaaagg
64201 gaaagtaagt tgcccaaggt cacgcaatta gaaaagtggc agtggccagt ggcgggtggc
64261 cacgcctgta atcccaacac tttggaaggc taagaggctc acttgagcac aggagttcaa
64321 gaccagcctg ggcaacataa caagatccta cctctacaaa aaatttttta caggaaaaatg
64381 agttgggcat ggtatcacag gccggtagtg ctactatgtt agaaggctga ggtgggagga
64441 tcacttgagc ccaggagcta aaggctgcaa tgaaccataa ttgcaccact gcacttcagc
64501 ctgggtgaca gagcaagaca ctatctcaac gacaaaacaa agaagaaaag tggcagaccc

```



64561 atgtgttgggt cctataaagg tgtatatact gtggagcctg ctttttgaac cactgccaaag  
64621 tactgggtctg gcaggctgat cattgtttcc ttttcttttt tttatagcaa caagcacaat  
64681 acaacatgga tgcttattat gaaaatatct tgaataaaca cccatgcagc aaacttttca  
64741 agtaaaagaa aaaataaaga gattgacttt aaatatattt ttaaatagat cttttttttt  
64801 taaatcactc catacatgaa agtcaataaa tttttctgga gcctagacaa tagctgaggt  
64861 gatatttttag cccctgggga cacatagtag ttaacaacac acagtaacgt caaagaagtg  
64921 atagagcatg atggaggatg ggtacactgg tcaggaaaat tgacctgaga aggtgatatc  
64981 tgagctgaga agataaccag gttatcacta aagaagagat cttttgaata ggatcctttc  
65041 atgcaaagac cctgatgtga gcctgggtctg ttagagagac agaaagattt tccaggctgc  
65101 agaatagtga aaaaaggggt ggcagaggag catagagtag ggtagagagt acatagacat  
65161 cacgtgtgggt aagaggtgta cattattgta gttgcaggaa aagaatataa agcagaggaa  
65221 tgatacgcca cagatagtca attgtttgggt aaaataattt ctgaaatagg taatttctgt  
65281 agcttataga caaatttcac caaggcagag aaaagaggaa aacagcatgg aataaagacc  
65341 ttatctatag actctattgt tatatatgac tagacaaagt cgttcctgaa aaagggttga  
65401 acattacaca agcatgcagc aatcaaagcc agtatttaca aaattcatat ttataaccct  
65461 aggcattttct ttttctctc tatcattaaa ataaatatgt attttacaca ggtggctcat  
65521 ttagactaaa aagttacatt aaccatgtaa agagatgata ggaggagaga aataatagtt  
65581 ttaactctggc tagatccaca caatttctca tggaagaagc tgatactaag atctggggat  
65641 agtgttaagg tgggaggtcg ataggatata gacacttgta agacaagttt tgcattttaa  
65701 aaacaacttg gaggaaaatt aatacatctc tattatgtca cttttcctat tgtttattga  
65761 aaacgtatca aatcctgaga gccagtgaat gctcatttct tattttattt tattttttga  
65821 gacggagtct cgctctgtcg cccaggtctg agtgcagtga cacgctctcg gctcactgca  
65881 agctccgctt cccgggttca gcctatttct ctgctcagc ctcccagta gctgggacta  
65941 caggcgcccg ccaccacgcc tggttaattt tattttttta tttttagtag agacgggggt  
66001 tcaccgtgtt agccaggatg gtctcgatct cctcacctcg tgatccgctt gcctcgccct  
66061 cccaaagtgc tgggattaca ggcgggagcc accgcacccg gccagtgaa agctcatttc  
66121 tatagagctc tttctattaa tactgacaga tcaggaagaa tttatggcgc ttaccaagt  
66181 aacagttagg tgacttggga taagataaat gagggagtcc ataaaagtta ctcttggctt  
66241 gaaactacgt gggagaaata ttgggtaaag gtggctaaat tttctatcatt ctgaggaatt  
66301 ctaagagctg ttggcatgag aaccactgca actcctgatg acttctctgt ggccacaaat  
66361 cttggcggtg catgggacaa gtctagaggt tcagtgggaa agggattagg tagaggaaga  
66421 aaatatatgt ggaatcctag ccacttccca taaaaaccaa caaaaataac taaatatttc  
66481 aaatgttttt agaaatataa aataattatg ttaaacattt aaaaataact aaatagctta  
66541 gtattaattt tcacataaga ttccaaatgt attttgacat atgaattctg accccagctt  
66601 atatgtgtga aaacaatagt agatttcgtg gggatgatat catttatacg ttatttatg  
66661 tagagtgtca cattttgcaa agcattttat ttaggtccat tacctcattt gattctcata  
66721 atggccctat atttagccaa agcacacgtg atttgtacta tttctgttag gaataaaaag  
66781 aacatcaaga cacaaaaaaa gaagttagtt ggtagccaat tagaccaaa ctgcagatca  
66841 accgattcca aatcctgttt ccttttttct aatcactagc ccagtgggtc tcaaagcctg  
66901 gtccctagat caggagtatc agcatcacct gagagcttgt tggaaatgcc aattgcagta  
66961 cctctccag acctactaag tcagaaatc tgggaagcga acccagcatg cctaacaggg  
67021 cctccagggtg atactgatgc ttgttaattt ggaaacctct gtagtagtcc atagtgactc  
67081 tccagcccat gacagtagtg tgaggagaac ttcctataga gggaagctgc acgtccattc  
67141 cccaagattt ccttgattac ttcacagcc acacacgtat taatagctga ttcttgggtca  
67201 catactattc catacactta acactgctgg caccaggcca tgacattact taacaaagga  
67261 tttgaccaac tgattctttt ccgtattgat ttgatttgta agatgaatca taagccaatt  
67321 attttactta tagcaatcat cataataaag ggtcaaaatc tacggttatg gagatgtcag  
67381 gccaaggaag aaccattttt tgtctgagct caaagcaaac tcacagtaag agaatacaat  
67441 attattttaa atttgcctt ggcaatattt tttgttcatt ttgttattt aatttttgct  
67501 tctttgggat tctattcagt cactggaagt ctgtaaagaa aatataaaa agaaatctaa  
67561 gctattagat taggaaggcc attggctggg attttcaaaa catctcaaa agtaaaatat  
67621 tattttccat tgaatctaag atgccatcaa ttgtggcaca aaataaatgt aaccattatt  
67681 ttatatacca ctatgaaaat taaaaaaaca gcctcaatc catgatgaaa caccatcaag  
67741 tgtgagagac attccaattt cagatatgtc aaaatatgaa aaagtatac ttagtattaa  
67801 tggaaatacag tacacattag ctgcagttgg catcttctc tggggcaaac tctgcttaca  
67861 tattttcttt tcataagcaa tgttgaatg gcctgttatg gtacagttat agtaactgtg  
67921 ttcttcaaag ttaagcagca gtcacctag cctaaggatt gtttcatgac atcagtaact

67981 aaacagtgcg ggtggaaaat attcttctac aatttggtat ctgagttatc atgtggtatg  
 68041 aggaaatagg caattgagca aggaagtga tgcagagtaa gagcgaacat ggagcactca  
 68101 ttcacttgaa taaatctttt gattgtaatt taaaaataaa atcattctca aatttggtgt  
 68161 tttatatacct gacagggttg ccttcttaat cagccatgtt gctttttttg ttagctgtta  
 68221 aatataatag agtgaactct attacatgca atcataaatg tcttgcatat tcccttctc  
 68281 tgtccttgca ggaagccatg tacttgcttg agaataatac aaagagacat actggtttgc  
 68341 aggaattttg agtcaaagag taagtccttg attcgttctt gtgaaaaatg ctccatgaga  
 68401 aataggaaac atggtctgta aactgctatt atattataaa gcttactttt ctgacctgga  
 68461 aaatttttatt tacacaaaaa agtcattgtt ggaaaaattt tcttttcgaa aaatattttc  
 68521 acaattcaga gaagcttcta tagtaattaa aaagtgcgta catattttatt tgagatattt  
 68581 ttaataaccc attaaacctt gtgaaaataa atgaaggcgg aagtctagag acatgagatc  
 68641 tgggttggtt tttggttagt ttcattctctg tgacttaagc atagttactt aattttctg  
 68701 ttactttttaa aattagaaat ataaacggtt gtaaaatttt gtaattggtt cagagggatg  
 68761 agaacatctt aaaaaatgat attaatatac aaaatacaca aaggtaactat gtatatatta  
 68821 tctcatttaa tcataaaaaa aaaaataagat agtgagaga agcattgagg catagtgcct  
 68881 agtgcattga aaacgttcaa catcactggc aggtattata attctatcat caataacaac  
 68941 aacacagcca ggatgaaatt aatgttccct tttcagtcga gaataatac tccaagggt  
 69001 tgggtggcat tcctgggata attctgatgg cccaggccag aattatgatg ttttctgctg  
 69061 gacgaccagg ctgtgctttc acccttacga ccacattgcc ctccgcagtc cttgataact  
 69121 taagcagaat gtttcgagca gaaagtcate ttttctattt aaattgtaat tccaacgt  
 69181 ttgcttgaaa acacctcaaa atggtatttt acatatctac tgcattgact ttgacctgct  
 69241 tttcccttaa agtttggtt aaacttgaa aatatcagta tacagaacca cctttctgc  
 69301 cagtttttaac tggaaaccga gaggtgtgat atacagagta ttaaacagta aagagaggag  
 69361 gagagatttg ttgtgtgggt gtgtgcatgt gtattgagaa acagggatgt ggactgaagt  
 69421 ttgaggaata ggtaaggaag gtcgaaggca ttttctcctt attttcctgc ctccctcat  
 69481 gttttcaagt gctacatact aaagaagaaa cagaagcccc aactgactaa aaacatcage  
 69541 ctaaggtaac tttaacacac atgcagaggg agacttgtaa aaggatgttc acttcaacat  
 69601 tgtttataat agtaactata gccataaatc ttttctatgt ttttctctat taatgttaca  
 69661 atttcaggtc ttacacataa atctttgctc cattttgagt tgattttttt tacatgggtat  
 69721 aagacgaggg tetaatttca ttcctctgca tttggatata tagttttccc agcaccaatt  
 69781 atcaaagact gtcttttctc catggaggtg tctcgccatc gttgtcaaag atcaattgac  
 69841 catgggtgat ggattttatt ctgggtcctc tattctgttc cattggtcta tgtgtctgtt  
 69901 tttatgccac tgtcatgctt ttatgattgc tacagtttca cagtagctgt taacattgga  
 69961 aagtattggt cctccagctt tgtgtttttt gatcaagatt gcttaggcta ttcagggctc  
 70021 tttgtgggtc cacacaaaat tttgggttga tgaatttgaa gatagctttg ggcactatgt aaactttaac  
 70081 gaatttgaca gagattgaat tgaatttgaa gatagctttg ggcactatgt aaactttaac  
 70141 aatgttcatt cttccaaatt aggaacaggg gatattcttc catttactta catcttctc  
 70201 aatatttttc atcaacattt tatagttttc agtttgagga tctttcacct ccttggttaa  
 70261 atgtattcct aagggtttttg cattttttcc tttttgtagc tattgtacat gggattattt  
 70321 tcttcatcat ttttcagata ggctattgtt agtatacaga aatgctattg attttgtat  
 70381 gttaatatata tattctgcaa gtttactgta ttttaattatt ggttttatca ggttttttt  
 70441 gctggaacct tttggatttt caatatataa aatcatgtca tttggaaaca gagacagttt  
 70501 aacttctccc tttccaattt ggatgccctt catttctttt tcttgcttaa tttctctgga  
 70561 tagaacttct gttagtatgc tgaatagaag tggcgagagt gagcatcctt atcttggtcc  
 70621 tgaccttagg aaaaaaactt ttattttttc accattgagt atgatgtatt tatagcctta  
 70681 tcatatatgg cttttatttt gttgaggtac attccttcca tacctaattt gttgggagtt  
 70741 tttattataa aaggacattg aatttgctaa atgccttttc tgcattctatt gaagtgatca  
 70801 tatagttttt gtccttcata ctgttaatca ggtataacac atttggtgat ttgctatgt  
 70861 tgaatcatct ttgcatccca tagataaatc ccacttgatc atgggtgaat aaccttttaa  
 70921 tgtgtttttg aatttgattt ggtagtattt tgttgagacy tttttttctg actctcaagt  
 70981 gtgttttcaga tagttaactg tcagtttaact aaaattgtag tcaattgcta aaaaagcatc  
 71041 actggactat ttattctgca ttggcatatt cataatgtta agagcagaac atacctcaat  
 71101 gtatcataac aaaatgcaca gtttttaggc aagcaatgac tgagggtatcc tcatcaciaa  
 71161 ataataatgc tttattttct tttaaaaaca ttaccacttt ttcaattgtc tctggattta  
 71221 ttataaagta ggaatacaaa cagatataga aatgtgaaat gcaggcactt attttgctaa  
 71281 actggctttt aattaaatgg acaatacact tactattttac ctaaaatcct gcattgcttc  
 71341 caaagatgct tgcccacctt ccttccattt tcttcaaaca ggagtctgaa acaccttcaa

71401 aaaagctaca gaatttgtgt tgtatatatt gtgctcaaat atatcatcta aacaccaga  
71461 ctttactga atatttagaa ttgttgaaat gatatgaaca ataaaattca aaactattaa  
71521 ttcacaacct aatcatttat tacatagggt gtaggtaaaa ttattatctc cttccccac  
71581 ccactttttt ttttttggc tgattaggaa actaacttga ttacaaaatt agtgagaaac  
71641 atatttgaga tccgaacaaa ttttttccaa taccaaaatt agctattgtt tactctcctt  
71701 taattcttac tgtttatttc cagttaata attaaaggac cctatcatct cccatgtcct  
71761 ggttttctga gcagagatta aatgagtttc tcaccaatta gattcaagca ggtgttaca  
71821 gctgggtctc cgcacttttg cccaaggccc actgttaca ggagaccatg acttcctga  
71881 atacaattcc tattaaggg aaatattaaa caagtgtcca ttgtcagaag cagttttcag  
71941 aaaaacaagg tttgttaat taaaattata tagaacacag gaatatgtga ttcaaaacta  
72001 agaaatggca gtgatggga agatagcaat ggcaaaaaag aaaaaaatt atgaactcct  
72061 atttcaagaa acatcgaata tagtgaaga aatcatctga cttacttta aaaaatcatg  
72121 gattcttttt agccttactc gtttttaaaa atgtatttta gactatgttc caggcacttg  
72181 gccagttttt gaaacacggc acagaagcag atgaaagagg ttaatctgat ggtagctgga  
72241 taagacaata cttcgaagaa ttaatgctgc atagtattcc cctgtgttca cctaattcta  
72301 aaagaactga agcccttcaa gtttaagggt gacccttcat gaagtgttac ctggtgggta  
72361 ggtgacttct agacactcct tttctccata catgtttgtc gtggcctgaa atgccattat  
72421 gagaagacaa ggcattgagt ccctgattac agataagtaa taaaagatac aactgctaaa  
72481 cagagctact acgttctgaa tagttacaga aatattaca ccataacatt aggtgaaata  
72541 cacttacatt taaagaccat agtcaggtaa ttagtgaagc atttaagtaa atatgattag  
72601 gttctttata gattttgata atgtggaaaa aattagacac ttaggagagc catggacatt  
72661 ttaagatagg tatagagtca ttagtaaaaa gtcattagta aaaaagaaca agaaaaaag  
72721 cagtcaactt caccaaaaca cacctagttc tggctcaatc tatattcaac tctgtggaca  
72781 caagaaatgg aaaagtggag ggtatttgag ctacataccc atatatgacc ttttattgag  
72841 tatctgcacc ttgataaaga ataaatatcc attgagaaga gaggacctta gaatccaaac  
72901 agattgtaac caaggctatc taaaaaagtt tatatgtctc atagatgagg aaactaattt  
72961 atcttatect ctgtaataac tggagttaaa actgaagtgc ttattcagaa cttgtagtta  
73021 gataaaactt catgaggcac ttgggataaa gcatgtacac gcattgttag cagaagacgt  
73081 agacaacatg gccttgtgta tttatcagtt tgtttcttgg catttgttta tcggattagt  
73141 actcaagttt ttagagctct acttttggat tgtaagtct aaattcattt atacaggtat cttccccaa  
73201 cttccctaag aataactcac ctcattgcta aacaggcact cgggtggggga aagagaatca gaagatactg  
73261 attatgcttt ctcaattgcta aacaggcact cgggtggggga tcaagatgct aagctttgtt  
73321 aaaagaaata caattttctg tttaaaaaaa agatggtaat actattcttt tttaaatcac ttaatttttt  
73381 atttggttcc ccccccccg gcaactatta actattcttt tttaaatcac ttaatttttt  
73441 ttttaacttt tacatttggg ggtacatgtg aaggtttgtt acataggtaa attcatgtca  
73501 cagggttttt ttgtacagat ttttcatca cttaggaatt aagcccaata gttatctttt  
73561 aagttcttct tctccttcc accctcctct ctcaagtaga cccagtatc tgttatttcc  
73621 ttctctgtgt tcagaagttc atcatttagc tccaattga aagtgagaac acacagtatt  
73681 tggttttaca ttctggcatt agtttctgta ggataatagc ctccagctcc atccatgatt  
73741 ccacaaaaga catgagcttg ttctttttta tggctgcata gtatggtgta tatgtaccac  
73801 attttctttg ttcagtcaat cattgatggg cacttaagtt gattccaggt cactgctatt  
73861 gtgaatagtg ctgcagtga catttgcgag catgtgtctt tatgggtcaa tgatttatat  
73921 tctctgggtt atatgccag taatgggatt gctggatcaa atgggtgaa ctaatttaca tccccacaa  
73981 tctttgagga attgccacac tgctttccac aatggctgaa ccttgccagc acctgttatt tttgacttt  
74041 cagtgtctaa gtgttctttt ttctccgcaa ccttgccagc acctgttatt tttgacttt  
74101 ttcttaatag ccattctgac ctgtgtgaga tggatatctc ttgtggcttt gatcgcttt  
74161 ctctaattgat cagtgatatt gagccttttt tcatatgctt gttggctgca tatatgtctt  
74221 cttttgaaaa atgtctgttc atgtcctttc cccacgtttt aatggggttg ttttctctt  
74281 gtaaatgtt ttaagttcct tatagatgct gaattattga cctttgtcag atgcagatt  
74341 tgcaaaaatt tactcccatg ctgtaggctg tctgttaacc ctgttcagag tttcttttgc  
74401 tgtgcagagg ctatttagct taataagatc tcaattgtca atttttgcct ttgttgggat  
74461 tgcttttgtg tctttgtcat aaaatcttta ccaataccta tgtccaggac ggtattgcct  
74521 aggatgtctt ctagggtttt tatagttttg ggttttatat ttaagtcttt aatccatctc  
74581 gagttgattt ttgtgtatgg tgtaagggaag ggggtccagc tcagtcttct gcatgtggct  
74641 agcgagttat ctcaagtacca tttattgaat agggagtctt ctccccattg ctgtttctg  
74701 gcagttttgt caaagatcag ttagtcatag gtgtgtggcc ttatttctgg gttctctatt  
74761 ctgttccatt agtctatgtg cctgtttttg taccagtacc atgctgtttt ggctactgta

74821 gcctggaagt atagtttgaa gttgggtaac atgatgcctc cagctatgct cttttcgctt  
74881 aggattgcct tagctatttg ggctcttttt ttggtttcat atggatttta aaatagtttt  
74941 cttctagttc tgtgaagaat gtcattggta gtttgataga aatagcattg aatctgtaaa  
75001 ttgctttggg cagtgcggcc attttaatta tattgattct tcctgtctat gaccacggga  
75061 tgattttcca tttgtttatg tttcctctga tttctttgag cagagttttg taattctcat  
75121 tgtagagatg tttcacctcc ctgattagtt gtattcctag gtgttttatt ctttctgtga  
75181 cagttgtgaa tgggattgcc tttctcattt ggctccaggc ttaactgttg ttggtgtgta  
75241 ggaatgctac tgacttttgt gcattaattt tgcactctga aactttgatg aagtgtgttg  
75301 tcagccaaag gagcttttgg gccaaagactg tgggggtttc taactataga atcatgttgt  
75361 ctgcaaacag ggagtttgac ttctctctct cctatttggg tgccttttat ttcttctct  
75421 tgccctgattg ctctggctag gatttctaaa gtgtgttgaa taggagtggg agagagaagg  
75481 catctttgtc ttatgccagt tttcaagggg aatgcttcca accttggccc attcagtata  
75541 atgttggctg tgggtttggc atagatgggt tatcaagaag gggcggtgaa ttttatcgaa agccttttct  
75601 cctattttat tttagattgt gtgttttttg tcttttagctc tgtttatgtg atgaatcaca  
75661 atgtctattg agatactcat gtgttttttg tcttttagctc tgtttatgtg atgaatcaca  
75721 tttattgatt tacttgtcaa aataaccctt gtatatttgc tgagagaaat ggtttctgtc  
75781 tcaaggacta taaaatgttt attaaaggaa tgtatttcac atgtttataa aaggaacata  
75841 ctttttatca gatatggcta tcatctcaca atgattttgc ataattccaa aggaaaaaca  
75901 tattcttgtt cacatgacaa aagcaatttg aatatatgaa ttcactgcct gacaccaaca  
75961 aaagcagtga acgcatgtat gtgttgaaag ggaagaaaaa atatatgttg tggcaaacg  
76021 aattttaaacc aaagaagctt ttttttaaaa aaaaatgtta acaacactat aaagccaggg  
76081 ggtggtagta tatgatgaat taattttatt gtttgaatac agcacttagt tgtcatggca  
76141 acctgattaa gctgtaacct gaagacaact atatctgaat cagcatattt agaaagataa  
76201 actgataact tcaaggtaca gtttgatgct ggggttaggg cagggtaaaa agctatttag  
76261 tcatctcggg ttgggattta gccttggctc ttaaagagca gcactgatac taagtaagta  
76321 attcagattg ttgattaaaa cttcagcaga aaccaatgcc aaaagttttg tagtttcata  
76381 acagaaaaaca cttaatatat aaagaaaagg gagggagaaa gaggaagaaa gaaaaacatc  
76441 actagtgaag agaattacct ttaattttta atcacctcta tatttgggct gagatattgg  
76501 tgattacacc aaccttttat tattattttt caatcaggta acaatgttta aaaacaaaca  
76561 aaaaccctag ttattttgac ttcatctctc ttttcccttc agagatagca aacaaaacta  
76621 ttttaaaaga ttgactcaat gtgctaagaa aatataattt tagcatctct gacatggata  
76681 gcatcctcaa aaccactctc tgtaattatc aaatattcta cttggagcag gaatgagttt  
76741 tgctagaatt ggaaaacacg gggagaagaa cttggttgtg tatcttgttc ctactttta  
76801 ctttagaatt tagccattt ctaacttcgt ttggggatca ccctactccc acaataaagg  
76861 atgacttcct gaacaagaca gtgaaagtcc agtggttaatt gcctgtacag aacttttcga  
76921 ccaaagcaat atgaatgcat ctgccagggt gttagaaagc aaacaaagat accaagtggg  
76981 gagtgtttta gggacaacct attgagctat ctagtaatcc cagcttctac ccacttgttg  
77041 gggcagcatc tctagaaagt atagctgaga aactcaggct tccatgaaat aatatataca  
77101 gttgcccaga tgtgaggctt tgttgtgtt cacttaagta tcacaaaact agtcaatgtc  
77161 tgtcatagac taagtttggg ggattaaggg tcatgggcac taatatgttc tctgtagtgt  
77221 gcatcgaaat tctctattct caactgggtg tgggtggctca tgcttgtaat ccagcactt  
77281 tgggaggcca aggcagggtc atcacctgag gtcaggagtt cgagaccagc ctgaccaaca  
77341 tgatgaaacc ctgtctctac taaaaataca aaatgagcca ggcattggtg cacatgcctg  
77401 taatcccagc tactagggag gctgaggggag gggaaactgt taaacccggg aggcagagggt  
77461 tgtagtgagc cgagatcacc ccactgtgct ccagcctgga caacaagagt gaaactctgt  
77521 cttaaaaaaa aaaaaaaat ctattctcat ccattttatg aaacatttct tttttaatgg  
77581 aaaaaataca gaaaatgcct catgcaattt cacctaacta ctgattcagg ataagaactt  
77641 tgattttaac ccagttatt tcagatttta aaataaatta gtttctctat ctataagata  
77701 tgtgaagagt ttcaactaca atctgtttag actctaagga cttctcttct cattgtatat  
77761 atttttcctt attaaactgc aaatacgcaa aaggtaaagt atgatatcac ttaaaatatg  
77821 tctgcttgat tttcctagga aataggcacc tagcagagaa catatggttc ttgagttaga  
77881 aagatacaca aggggtatgg agggactggg aacgagggga ggggagtttg aggcattcta  
77941 gacaaactga ttctgagatg gaacacaatg aagagcttcc tctccaatga atagatatat  
78001 gtaaatgggt aaagaatata ttgaagatgc tattatactc tactaaacct agaagtggtg  
78061 gaacccacgt ctctatacc taatggccaa aagaaacat gcgactattt tcaaggtaac  
78121 atttgagatt tgaacttgac ttggccaaaa atgaagacac aagggaacaa aatgatcaat  
78181 ccccttaact agttctgacg aagagtcttg ttacaacctt tcctgtggc aaggagaaag

78241 actaaacata gacactcttc tcttctgagt gagattcttg gatttaatgg caaggaacaa  
 78301 cttttccaga gtctctctt tcttcgctag gtattttgta ttttttggg tttatctcaa  
 78361 cttgatgtac aaactctctt tgtctttgtt tatntagaca actgtttacc agttctgacc  
 78421 cacaagtggag gtttatctgc gatggaaaga ctgacttcca ttgagttgag ttccatggat  
 78481 aataataaca attttttaa aaggccatac agacatttaa tctcagcaaa cacctctcta  
 78541 ttcaatttta ccaaaatcat gaattatttt gctttgtttg tctttgtaga gtttctgtt  
 78601 ttaatatgtt tttaatagac aacaaggcac aaagaatcct gggtaaataa tacatgttaa  
 78661 aaatagttac tacctaacaa tgttactaga acaattagag tgcagaaaac tctttcacat  
 78721 gagaagccag ctaaaaacaa aggttggcat gacgtatttt ctttgattct ttttaaatta  
 78781 atacagcaca ttgtctccaa actcatctct cccacttaa agtatttggg tttttgttg  
 78841 ttgtctgctt tgcaatgctc cctaaaatac accactgtgg gccctattct ttgtgtaatt  
 78901 ttactttttt cttctatttt taaatagata cccctgggtg caatgtacat ttatatgtga  
 78961 gctatatata tatacctttt ttccactca gagagcaagg gaattatttt taaagaatc  
 79021 ctctttctag ccagattcca ttaggttgta ttattcaaat gcactgtaac ataaattta  
 79081 tttcttcatg tgggtgtccag ttgctaagga acacagccaa aaagtccaac ttgcaaac  
 79141 aacagaagac gagtagagat tatgaggggt gcccatagac acatacagag gctctgagca  
 79201 aggggaatta cacttttgtt ttcaaacttg gaagtgcata atattattaa gaaatagtta  
 79261 tttttatccc atgtacaatg gaacttccat tctccctgga aaagcacagt agcttttcta  
 79321 gactcatgac ctctcaagtc atgcagcata ttttaaacag aagccctatc atttctgctt  
 79381 ttaaattgtaa aacaggcttc ctgaaaagca tacgatttct gaaatgtgct gtcattgtcca  
 79441 ccaaacaaag cactttaact ttgtttttct taaaggcaaa tttctacaga aacatgaatc  
 79501 cgacagagca ataaacacca cctgaatcat ttcaaatgt ctcaccaag tttactggac  
 79561 acatgtaaaa ggtggtgtct atcataaaga cctaaaagat ggtatgatat cagagccttt  
 79621 cgtaaagtcc tgaaagaggt acttacattt tgccgtcact ttgtaccctc ctgagggagg  
 79681 ggtgtggcct tccaatgcat caaatccagc agatactaag accatgtctg gatcaaaactc  
 79741 tttggccaca ggcttcacga tggctctgca cagtaaaaat gcaaccggtc acacgtggga  
 79801 ctggtgaata cttttaaaaa tegtctcagt aaaacgacct ggcacaacaa taggaacctc  
 79861 ccaagaataa agaaaagggt aataaaaaca ttatttgaat gggacaaaag cgtatcattt  
 79921 ccttaataat aaatcgctgt tatttttagca tccaattca gtcttttttg gttcatcttt  
 79981 tttctccaa atggaaaaaa aaaaaaact gctttgcagg tacattctaa agcccatcat  
 80041 attacacata cgtctgtggc tgttttatcc cactgcctat aaaaaactgc tcttccaa  
 80101 ggagtgaacta atgttttaca gaggaagtc aaagcttttag tgaaaaccg gcttgctcca  
 80161 gttagtgaacta acttgggtga aatttgaact ataaatttct tttgggaaaa gtttgcttct  
 80221 ccaacttaaa aaaaaaaaaa acatttttaa atatttatca tggtaggggg tgactcttgc  
 80281 aaaggagaaa cacaaagttc ccttaataga atccagacta caatgttaag t

&lt;210&gt; 36

&lt;211&gt; 122186

&lt;212&gt; DNA

&lt;213&gt; Homo sapiens

&lt;400&gt; 36

ggatcccaaa tatctcagag ctggtaggac ctgggggtttg aatactgacc tttgacacaa 60  
 tgcggaagag tctacgtgac tcagagatca cgttgggtccc agaaggaaaa taaggaaaaat 120  
 aagcctggcc accctggata ggggtagggtt gttgggcctc aaagagggtt gcctgagcaa 180  
 gagtggctca ggctgggca ggcactgtc cccaggagca cctccctgc ccatcgctc 240  
 cctctgccc tccctctgc acatgtcaca ctgaccacat ctgtagacat cttgagttgt 300  
 agctgcagat ggggaccagt ggtccatt ttcattttag ccattttgtc tcctgcaccc 360  
 actcccttca tacaatctag tcagaatagc acttctaggg cacacgttct cagtccaagc 420  
 tgtgggaaag ctcccttat ccaagagagt ttaaaggtag tgacttgggt ttttgcgagt 480  
 gttttgttta gtaaggactt gtggggagga accgtgctaa gccataacca atgaggagaa 540  
 gcaagacagc ctgtctgccc ccaggagcca gtcctctgct cttctgcagt caggccactg 600  
 ccttggggct ctagtcatc cagtgaaga tgaatgtaac ctgcctgggt acgtgacaac 660  
 cgtttcctcc ctgaccccg aggagctggc tctagaagggt tgggatcaat cctgaattta 720  
 gtttatgtgt tagatttata tatatatata tatataaaat atatatata tacataatat 780  
 atataaaata catattacat atatgtaaaa taaaaacaa taacctttct ggggtttctc 840

```

gtggcagttg aaatagtccc tcatgtggtc gtcagaaaat aagccattcc tcataactaat 900
atgggataag ctccttgacc tctgaggagc aggagtgcct cctgctgtgt gttttagaat 960
ccctccccgc cttgtttcgt ggcagtgaat tgcctcttgg tcctgtccaa atgtgtcttt 1020
cactgatttt ttgaatcatg ttctagtgtc ttggctctgc cacatgggtc cagtgttcat 1080
ttgagcataa ctgtactaaa tcttttttcc agatcagtat aataaaggag tgatgtgcaa 1140
ttaaaaaaaa acaaaaaaac cgtggctcag gcctatgtgg actcaggctg cgggtcccag 1200
cgtaagaca gatgcttagc ctggaggagc gcacacaggc acactggaag ctgggcttgg 1260
gagtggcctt gaagcagctt tctcccgtg tcttgagctg cttttttgtt tttgtttttg 1320
ttttcagaga aaatcccat tagccatcag ctgcactaac actagcagta gtttgggtct 1380
ccccaaagaa gggttgacc tactctctcc ctttggggat gccccagttt ctatttcttg 1440
gtctccaagt cactgaacaa atagcctcct tgtctcatca acttttccct gtagcagata 1500
tccttgggaa gtaccccat gctagtgtcc caggaagacc cacctggagt agagaaagct 1560
caggccaggc gtatcccat ttctctaaa gtactcctg tcttgagttc ttgttcatgt 1620
ctttggccac gggagctgaa gccaggagct ggagttatgc gggcaggagc atgtgggtga 1680
tcctagcaac atttttgtt ctctgtgttg attgtaagaa tgtagtcaat gctgggagga 1740
cctgctgcag tctgcacag gcctcctaca gggaaactct agcccaaaag ggagagtaca 1800
caccagcttc catggcccat tctacccca caccacatcc tgccttgaa gctgctcagg 1860
caggcgattg ggggtactgg actcgccag gctggagggt agaaagtata cttecttact 1920
gtgtggcctt ggatatgtca ctctctctc gattacctca gaggagactg agaagagact 1980
gaggccatca gagaggaagt gacatgtcca aggccacgca gtaaggagat atacttctcc 2040
tctcttgttt ttattgactt tcttagaatt ttttctttt atttgtagtt gacacataat 2100
aattgtacat atggaataca gagtgaatt tcaatatggg tacacaatgt gcagtgatca 2160
aatcagggca attcgcttat gtattgcccc aaacatttat catttctttg tgttgtgaac 2220
attcaaaatc ttctttccta gcttttgggg aatagaaggt aaattatagt taaccagagt 2280
caccctgcag tgttgagaa aaccagaatc cattcttctc gtccagcttt aatttggtat 2340
ttgttaacca acctctcccc atcttcccc ctctgtacc catcccagcc tctaaatacc 2400
catggttcta ctttccaggc ctccgtttct tcagttgtaa aaccagagag attgaaactg 2460
agcttctaaa tgggcccagc ccctatgcgt accggccac tctccagcag tgacgggcat 2520
agcctgcctg ttacctggag agcagtaatc agcccagaaa tcttgttgac aaagctaagg 2580
gcagagtttc cattggaaaa aagcagcttg caggaaaaat tgttgataag aagtggaaat 2640
ctatctaagt aagccatata tctcctgtc cactgcctga ggctcatgg gctccccact 2700
ctgagtctg ccacgtcca agaagctgt ggagttcccc agagtagcct tggatgaatga 2760
gagtatgtag cctggtttcc atggagtgc ccactagccc tgtgatatgg tttggctgag 2820
tccccaccga atctcaactt gaattgtatc cctcagaatt cccagtggt gtgggagga 2880
ccagggggga ggtaattgaa tcatgggggc cagttttccc catgctatc tcatgatagt 2940
gaataagcct tatgagatct gatgggttta gcagggggtt ccacttttgc ttcttccgta 3000
tttttccgtt gccactgcca tgtagaagt accttccac ttccgcatg atactgaggc 3060
ctgcccagcc atgtggaatt gtaattccag ttaaacctct ttcttctccc agtctcagg 3120
atgtctttat cagcatcggt aaaacagact aatcacacct gatactgcag ggggtgtcag 3180
tccatggctt ttagcagggt ctcaaagggt atgcatagtc ccaaagggt taatgaagaa 3240
caagcttcag gggtaaactc ctctctacaa ctactgtgtc atcagccact gaatttccca 3300
tcgttcagtc agtcataact ggtgagcctc ttaaatgttc ttagagggtc ttagagctgc 3360
gttgctgggg cccagcctcc tctggaaaga gccagtggc agacagagga ggtggcagcc 3420
ctgctggggg cacaccagc actcacactg ctccatgggc ctttccata gaacagacac 3480
tgttctctcc aggtgcaggc cacaaagggt gacgtgtct gtgctaccac ctactcac 3540
cttcttgtgg ggatcatgat caaacctggg aatttgatgg agtctaaatc aaaattaagt 3600
gtaaccagg ctatctctg ctgcttctcc cctgcaact cactcacaac ataagcata 3660
tagagtgttc ttttttata attttctgac tgatggaagt gaagtgtctt agggcttagt 3720
gtcttagaaa agtctaagag tcttagaaaa agggatcctt ttcttttcta attttcttt 3780
tcttctcctt tgtttttttt tttttttttt tgagacggag ttttactctt gtcgcccagg 3840
ctggagtaca acggtgcgat ctctgtctac tgcaacctct gcctccctgg ttcaagagat 3900
tctcccgcct cagcctcctg agtagctggg attacaggca cccgccacca aagccggcta 3960
attttgtat ttttctttt ttttagtaga gacagggttt cgccatgtta gccaggctag 4020
tctcgaaact ctgacctcaa gtgatccacc cactttggcc tcccgaagt ctgggattac 4080
aggcatgagc caccgcgccc ggcagggct ctttttcta atgtgcataa ggtaccatat 4140
ggtggccccc taagccctcc tctagagctc ctgtgcgaat ggcctagtag ctttgtctaa 4200
catgggtaca aagagctatc taggaggagc cattgaaagc tatggggtgc tgttccatct 4260

```

```

gtgcatgata cagagctttc taagcataga gccatccaaa gagagtggat tgccgtggga 4320
ggtggttctc cactaggaaa attattcaag catgggctag aaaactgttt ggctagaata 4380
tcatagaaga aatttaagat gattggacta ggtggtgctg ttgccttcca atcttgagat 4440
tttcagagct gaattgtatc tcttgggttt tactgtggac attgtggtct gtagaaaata 4500
atttccaatc gttcttacac atatttaaaa gatgtgtgta tgaaggagct ggggagacag 4560
tcggggcagg aagtagtttg gatattgttct atttatacag taaaccctct ccactcccaa 4620
ttattatcac tctgttctct gtacgttctt tctgggaggt actgagactg ttctggacaa 4680
agaaaatgga tacatggttg ggatggtgga gaagaaagag agggatcac cttagcttgg 4740
catgatatta ttatgcctga gttatgcacc agaataaaga gaagacaaaa agttaggtag 4800
gtcatgcagt gcttagcact cgatggggca gagtttaatg gatgatgaaa cgaaaaatag 4860
caagacaagg gtgtgtacgc acaagtacat gtgcggttgt ggctggcgga cacacaggca 4920
tatcttctcc tggaaaagcc caacacttgg ttgactctgt gtgtggcaat tttaggaaga 4980
agaagaattg tctccactc tgtggggaaa tagcttagct ttccatttct ttctagaagg 5040
agtaggaact ttggaacaat gtcaacaatt agaaagccca gtttagatca ctccagtccc 5100
aacctggcag agagaggacc cctctcctgg ggtcgattag gggccacatc ttttgtgccc 5160
ttcctgctca ttggcactcg aggatgagtg agtctcactc actgaggcat gaattgtgtg 5220
gttcatctgg ctaatgaggg atcagggaga aagcttcact tcatttaagg tcttcttccc 5280
tgccgtggct cacacctgta accccagcta cttgagaagc tgagggtgga gattgcttga 5340
gccaggaat tagaggctgc agtgagctgt gattgtgcaa ctgcactcta gcctgggtaa 5400
cagaggagac cttgtctctt aaaaagaaaa aaaaatagtg cttctcatga tgggaattcc 5460
agtcttgagg ttgcatgctc tcagagctag aaaagacatt agcggtcaga cttcttgtcc 5520
actccatggt ccttctcaga gtcacagctt taccacctt aggagggtcc agtcaatgtg 5580
gagttaaact gagccatgag ggactttgat ttttgcctc ccagggtctt gccaggaca 5640
cctggcaatt gccaccctgc aagactgccg taggcgagat ggccccgggg atgccccatt 5700
aacagaagct gccgcaagat ggggcgcct gtggtgtggg ctgacaggca gacgtgtagg 5760
agaggcaatg gttgtggctt cagtgcactgg aaggaaacgt gttatcttct catttcttgc 5820
taaggcaagg tcagcactgg ggtcagggtc aggcagggtt tttgatgtgg gatgcaggcc 5880
ctggagggat ggaagccagg ggctttctac agagttgagc tcttccccct ctgcttctct 5940
gaagcttagt gctgggggtt tgggtatttct aaagcagggt caggagaggg ttgctctggg 6000
gacggtccca gcaaaagcag tgggatgttc tgtgtactca gaacatgaat tgctggtggg 6060
gtgggcgtgt gacgtggcag agggcaggta ttaagcagtt tttccacctg tcttcttctc 6120
caccttatgt ctttgcccca gtttctata ggcttgcact tggacttaga ggctgaatct 6180
aggatatctc tctaaaagg accgtccact attggaaagt cgagttagga ggagaggccc 6240
atctattgaa tgggatttct ccagatgaga ggggctgggt gacagaaagt ggatggaacc 6300
tggtgaggc ctgccatccc ttggcctggg gatccttggg aggaaaagaa caatccccag 6360
gttcttccct catgacctgg ggattgttct ctgcattgct cctgacttag tggaaagtga 6420
aggtgtccac ggcttagggg tgcagaaatg actcagagct aagctacctg gattcaaact 6480
cagctccaaa gacaatcacc ttccctgcgc ctcagtttcc accctaaga taggggcaat 6540
aaagtaccca ctggaggagg ctcttatgag agtgaagtga gtgaggacac aggaaaacca 6600
tggagcaggg ccagtgccg agcagtaggc atctgctctg atgattgtca ttgcaaaagg 6660
accagttgg gcactacaat cagcctgtcc tcatgtggcc ccaggaacca ccacttgctt 6720
agctgtggga ccctgggtaa gtcactcaga gtgctctgaa atttggcttt gctacaagta 6780
ggactgctcc ctgcctcaca gaactgttgt gagggctaaa tgaaataatg tatgcagagc 6840
ttagcaggcc tggcatgtag taaatactcc ggaaacattt tttttaagtt ccagggtggt 6900
tgtctatctg gatgtcacct ctgacctctg aaaaccacag ggatttagga taggaaagca 6960
gtgctccttt ctgcatecac ccgggtcccca cctcaccttc ctgagacca ggaaaggagc 7020
ctgaggaatc aataaggcca gaggaggaac cctgcagagc gtggtcagct gggaggact 7080
tgggcagtag gagcagaggg ggcaaaggag ggcttgggtt ggggttacgt ggcagcatgc 7140
ctgtcctcag cagacacctc ccactgcccc tgcttcttgt ggggtggggc cagcccagct 7200
taggttatct tggctcattg tccactagtg ttttctcag atgctccctg ggagctggca 7260
gtactggagg ggggtggcaag tggcctcagt cggctcacag ttctaggacc gggcccaggt 7320
cttgaagcc ccttgagctc tcccccttcc ctgcttaggc cactggaaga cagaggtctc 7380
caaagaaaga caaaagctgg ggtctagaca taccctatct ggggtctgac ttaaaggcct 7440
ttgccagggt cacctcctgt tggcatcaga gaaggaaaga agtgtgtgtt tgtgtgtttg 7500
tgtgtgtgtg tgtctgtctg tttgtctatg tctgcagggt gacaagtagg gccgggtgtg 7560
agtgaagtg gaaaggatac tattctgccc atccctcctt gctggcccc cagccagctg 7620
ctaagatcca gagtctgggc agcagagtca accctactgc agctgggggt gttgagcatg 7680

```



tctggggaag agctaaaagt ggcagaaaac atcctgtttg aaagcaatgc tttgctgtat 7740  
 ttaacccctg caacacctgc tccgcctaca cccggtctcc acagacagga gatctcagac 7800  
 acctgccttt gaagctgtcc caagaggcca aggtctgtggg ctgccatcca agcctgccc 7860  
 attcccagct cctgtgcggc acctcctctg ccttgccctgg ggcagccgtc ttcccgtct 7920  
 tagcagcagg acacatggcc cagttgtctt gcttcctgag ctgcctacaa tctggagatg 7980  
 gagggggtag tgagagtgtg ggctcccta acgaaaaggc ccttcctccc tctgacacc 8040  
 ctgggctgtg agaggagaag gagtgcctag gcgaggaggt gtttccttct gcctggggct 8100  
 gggtgcccgc accgcttccc actgtcctg ctactccctg cctcgaggga gggccatcct 8160  
 ggetgctgcc cagccgccac ccccacacc ctgccagcga tgacatggca tgcctgctcc 8220  
 caacaagcca cttctgtttg cagtactga tctggggact aaagtccctg gaaagagcct 8280  
 ctctgcccga cttccttaga gactggggag gcggtcagcg ctccgctta gataaaagg 8340  
 ttccccttct tcatttcaga agcctttggg tctgaagtgt ctgtgagacc tcacagaaga 8400  
 gcacccctgg gctccactta cctgccccct gctccttcag gtaggtgttt cctcatcagc 8460  
 cgcaacttcc ctggctttct gtttcaagg ggcgggggtg gggggagggg cataagaagg 8520  
 tgggtgggag ggggaaggag ggataccacc caggattttg caaggtgggt cccgggccag 8580  
 cagagtctgc aactgagatg catgagtgtg tggggtgcgg gtgggagttc agagaagggc 8640  
 tcaggagatg gggcttgctg gctccagcca cgaccctggc tgggctctcc tgtgcgtctg 8700  
 atgtttctta tccagccccc atctcctctt tctctttgct gccttcttta gtctctgcct 8760  
 gtcattcctg ggactttcag ctctcaagcc acagaggctt ggacatctcc acatgtggac 8820  
 tctggctctg ggcgctggct tcttgatagc agcaataaac ctcaagcagg gttgggtctt 8880  
 ctgtcagctc ccttgaaatg gtctcattca ctgtgggct ctggctgctt gatccagcct 8940  
 ttccagcctt cacccccagc atagagactt cctgatgtca aggcagcacc ccacccatt 9000  
 gcaggactgc cccgttgctg tctgtgtgta gtatgttgtt ccactcgctt gcacatagc 9060  
 atctccaaat gagtccatgt gatgctgaac atgtgttgac tgatttaaca gatattcctt 9120  
 cctacccccc atttgatttc tctgttttcc acgaaatcca cgggatactt gggagcctgg 9180  
 atgaccaga ctctgtagca acaccacgat gactcggagc tgcagcatct cagctgacc 9240  
 aggggttaagc cacaagcatc ctggacagtt tcccctatta cccacaatg atattgggccc 9300  
 tccgggatgc tggccacatc ttgaatgtgt gctatgttct aaaacctgca ggcacagct 9360  
 tggacttggg atggcttttg gggacaatgt tgatagatcc acaagcactt tttctatatt 9420  
 taattgtttt ttaaattatg aaacgttttg tatattcaga agggcatgca aacacagata 9480  
 tacaaaacat agatgtagt ttttgctaata aataataaga agaagatacc atatgctcac 9540  
 tactcaaaaa atagaatact gctactatat aatgcacacc cctccccgat ctcatctctc 9600  
 caaaggtttc tgtaaatcat tcctttgttc ttttttctg aacttttctt ataggttcag 9660  
 ggggtacctg tgcaggtttg ttacaaagg atattgcaag atactgaggt tttgagtatg 9720  
 aatgaattgt ctcccaggta ggcagcatag tactcaatag gttgttttcc agccctgcc 9780  
 cctgtccact tgtattccca gtgtccattg ttctcatctt tatgtccata tgcacatgat 9840  
 gtttagttcc cacttataag tgagaacatg tgctattttg tttctgttt ctggctttgt 9900  
 ttcccttaga taatggtctc cagctgtatc catgttgctg caaaggaaaa aggacagtgt 9960  
 atgtgtgtaa aaaggacagt atacgtgtgt aaaaaggaca gtatatgtgt gtgtatatat 10020  
 atatataac acacacacac acatatactg tattttcttt atctagtcca gaggttgatg 10080  
 gcacctgggt tgattctgtg tctttgctat cgctgcaatg atctttgttc tctttctgaa 10140  
 agtgcttctc tctttatata taggtatata tttatacttg ctaaacctta atgtatatgt 10200  
 agctgctaaa atttaataata tacattaaat atgtatttat atatttaata tatattaata 10260  
 tataatataat attaatatgt atttatata ttaatgtata tattatata acattagagt 10320  
 ttagcaagta taaatctagc tgtgaaagaa attagcaata gtgtcactat tactattagg 10380  
 atagttcaaa agtaattgcg atctttgcc tttttttga tggccaaaac cacaattact 10440  
 tttgcaccaa cctaatacat taaggtttcc aggaaaagaa agctaaaatg aggttaggga 10500  
 atctccaggg tctgtgaccg ggattccctc tgtcccttg ggactgatga taacatatc 10560  
 ttgcttatct gcaccattc tttcccttg tgtgaagctc tttggggaat ttttagaaag 10620  
 tatttgtttt attcatttg cagtagtggt ttctagacat atcttaaggt ttgggctct 10680  
 ctgggctca tttgtaagg ggtatgatgat aatagcatct acaccatgaa gtggtatgaa 10740  
 ggtgaaataa gacttaatga gctttgatat tccacacct agatcagaga tcatgggct 10800  
 agtcattgaa aagtagctca gaccctccca agggccccca gaactgcct ctgtcacca 10860  
 agggcaggag gaaatggtac cctggggttg agtgggttct tgtctcttgt tctctggct 10920  
 tctctcttat ttttctctg acaagaagga cctttgcct aggggtcaag gggcactga 10980  
 aacctgtaat gacccttttg aggattcaga taaaattggg agaactggga ggcagtagg 11040  
 tctgaaagca tttcagggca gtctgaggta tcccagaatc atctctgagc ctgacagtag 11100



acgggatcag acgcagcaga caaagctggg ggcccagttt tggctaataa aagagtcaag 11160  
 ccagctgctt cctgagaagg ccttcccaaa gctgtgggct ttcgttccgt ctgtctcttc 11220  
 tccttttctt caagtatgaa atccatctct agatgataat gcctgttttag aaaaaccatc 11280  
 tctgaaaaca caattaattg tataggactc acatgactca gaaggacatt caaaaataatg 11340  
 ttttaagtgt tattgccaaa aaaagggggg ggaaatatct tgaaatgttg attgtcttgg 11400  
 tacaggaaca ccaggggcat aagcctatta gccctgagct ttatggttgt gaggagctgg 11460  
 ggctggaatg accagggcac ctaaactctc aattccccc accctcaaga ggaggagacc 11520  
 tgagggttct tctccacatg taggtgctga ggctgaggga ggactctcat tttcccttgg 11580  
 agggggcggt gggcaggata gaagcccctg acctggttca ggtctgtgcc tgaggcagag 11640  
 ctagtgccag tagcatgaat ggggttcacg agaggtgaac cactaaaccc aaattaacct 11700  
 cctcttccaa tgcagacagc gggggcatgc agaggtgaac cactaaaccc aaattaacct 11760  
 gacagatgca acatctgaaa ccaggcagct gattccaagc catgctctga gccagctatg 11820  
 tagggcgcat catgtatgag ggctccgaag gcaactgtct caggcctggg ccctggggag 11880  
 atgcccaccc ttgctgagct ccctgggtgt ggggggtggg ggcggtggga tgaggctggg 11940  
 ggtgggtggc accaaggatg ccagctggcc ctggcactga ctctggctct gaccgtggcc 12000  
 tgcttctgtt tcttacaggg atggaggcaa tggcgccag cacttccctg cctgaccctg 12060  
 gagactttga ccggaacgtg ccccgatctt gtgggtgtgt tggagaccga gccactggct 12120  
 ttcacttcaa tgctatgacc tgtgaaggct gcaaaggctt ctccaggtga gccctctctc 12180  
 caggctctcc ccagtggaag gggagggaga agaagcaagg tgtttccatg aagggagccc 12240  
 ttgcattttt cacatctctt tccttacaat gtccatggaa catgcccgcg tcacagccac 12300  
 aggagcagga ggggtcttgg gagtggtatc ttcttttccc tctctcagc tccagatgtt 12360  
 cctctgactc tcttggaat cgctttctct aggttctgt gtgggtctct gtctttccat 12420  
 tacgctgtga acccacagcc tctacacca acccagctgt ccatccttcc agagtgaacc 12480  
 tctcctctgt tgatgatcac agcttctcca ccaagagac aggcattgtt ttggggaaag 12540  
 cccaagaact tggtttcaga gcttgccttc ccatccaatc caaactgttc ctggaacaa 12600  
 gggaaatggc acctcttgtc gggtcacac gatctgtacc catatcttca cccaaggact 12660  
 gtttctctgt gtctgaaagc caaccttggg acatccaggc agtgctcagga atgtacctgc 12720  
 ttacagatgt gaaaggtgtg gggaaagcac tggaggttcc cattcaaagc caggggtggg 12780  
 gcgtgggaaa gggatgaatt ggggcaggaa ctgggaatca tgagaaatta gcatttggca 12840  
 tgtattggag agagagagag agaatagcct ccaagagagc agccaaaaca gatcttctgt 12900  
 ctagcggctt agactggagg tggctatggc agggctctaa ccatcaaagc aggaaagcac 12960  
 aaatcaagtc cagaggagga tgctgaggtc ggcttgggtg ttgtctaaac cggagtgtc 13020  
 tctctgcctt gggggcacag tgaattcaag tccaggcgct tgtgtgggac tcttactcaa 13080  
 ggacttgggg tctctctgtc aacacaagct cctgattcac ctgccctctg cctcaggaat 13140  
 cagcaggccc agagtttcat ggcttggagc aattgctggg cagtgggggt tctgtgggtg 13200  
 ctaattgcct gtttggcctg gcactggctg cccgcttggc ctgttggctg catttgccaa 13260  
 agctcgggga accagacaag cagcatcgct ggctctaagt cgtgttctgt catttgccaa 13320  
 tcttgggccc tgaggtccac acatcttcca ggggtggcct tctagagccc cagttgtgtg 13380  
 tcccagggtg cacatggacc ctttcttccc aggtcctcta acttgggggg ctgccttgag 13440  
 tgctaataag aggggaatct aacgcacacc tcagcgctg cttactacca tgaaacccat 13500  
 cagaaaggca tggctctggg tgctggccat ggcaataatt tatgggatgt ccttgcctaa 13560  
 atggatgtcc ttgacatata taggttttag ttaactcaac taatggcatg catgtattga 13620  
 tatccacccc ctctgttaca tagtgttaat ctgaggatta atgagatgac atgtaaaaaa 13680  
 gtgctttgaa aaacactttt tcagtctgat gaaaaaagct gagatttttg agcctgatgg 13740  
 gtcaccactg ctgcccttca tgggaacctg ctctcataaa ataaacaaaa gcctcgcagc 13800  
 cagccagcca gccactttcc tctgtgtgtg gtgtgtttgt gtgatttttt tgtagtgtatg 13860  
 gggcctcctt atgttgccea ggctgggtct aaactcctgg gctcaagcga tcttcccatc 13920  
 ttggcctccc aaagtcttag gattataggc atgagccacc atgtctggcc ttgtgtttct 13980  
 ttcactcatt ccgtcaccag acttcaatct gcatttataa tctggcattg ggctaggagt 14040  
 tgtcaatatg gagatttcca ccgaaggcca tatcttgcca gtctgcaacc aaagcatttg 14100  
 gttatggagt ctctacccc aaatccactc tctcctccta ggctcctccc cccctgagat 14160  
 tcagctctgg gaaatgagaa tcttaggtgg cagctgggtg ggtgggtgaca cattggaggc 14220  
 cagttcctca ctggagtggc tctgactgct atgcatctgt agttgtctgc cttggacaca 14280  
 ccactaggct gggaaatctc aggcacagg catgtgaggc atctgggtgg agagaggaca 14340  
 ggtcctgtca tgcaccaggc tgagtgtgaa agatggcaga atgaacaagg atggatgtt 14400  
 tgaatctgt gtcaccacag actgacagag tggctgtgtt gcttgtgggc acatgatgcc 14460

accttaaccc actcttagtc caccttgaca agagccctta gagtctgttg ctggctgttg 14580  
 gtcacaacca ctgectgcaa tgcctggcac tatgggctgc aggctggttt tgtcttgta 14640  
 ccctgtcctc agtctacctt acttagatct ttactgtctc tgtcttgatg actaagctag 14700  
 gctgctacat tctaaagagc caacatgtct gtcatttgct tgaggatgtg gatgaaagag 14760  
 aatgagtggg gttatctatg gattgttcaa gagtaatgtt cagaaacttg agggaaggte 14820  
 actgaagctg tcaagaaaga cagctgcaag gttctgaatt ttgtttgata tgtacataaa 14880  
 caaacacaca catgcacaca cacacacaca cacagtcaac cttcattatt catggattct 14940  
 gtatttgcaa atctgcccac ttgctaaaat ttaccaaact caatacttgc agccctttt 15000  
 tggctcatttg tgaacatgtg cagagcagtg aaaaattcac atgacttggc acctatcttc 15060  
 ccagccaggg tcttcacaat ctatttagtg ctacattttt tgcctttttt tgatttttat 15120  
 tgggtgacttt gctgtttaaa acagttccca agcgtagtgc tgcactgctg tctgggttc 15180  
 ctaagtgc aa ggccgtgatg tgcctcacag ggaactatg tgtgttagac aagcttctg 15240  
 aggacaacag tgctgctggc tgtttgatca atgtttaata ctcaaccaac aatatctatt 15300  
 gaataagata tcttttaaca gaaaactcac ataagacaag gttatgtgtt gatcagttga 15360  
 tgaaaatttt gtgaccagag gcttgacagaa acctcacctt gtgtttcttc caggaacagt 15420  
 gtttcaatat tctaatactc agtgtccaca gtgactatag accataacta ccatgaataa 15480  
 tgagaatcag ctatacatat atcatttctc ctctctctcc accctgatg cctgcttctc 15540  
 cttctttgct tcatccaaat tttatttgga agttttccat tttgatctgg tccaaatagt 15600  
 tgcttgagaa ccctgtggtc actcatatct gtttggtgaa ctctgatccc aggaagcaag 15660  
 gacaatgtca gtggtctgta ccttctctgt ggtgggtact gcctccttgc atccttgga 15720  
 acacagagat gacaggaacc aagtccttgc tctcaagaag cttgcttgac catttctga 15780  
 tagttattga cagacagcat tgctgaata ttgggtcact agctcttttc caagccctgg 15840  
 agaccagtaa tccaatccca tttgaccatt tagtatttgg tttggcttct aagatagtta 15900  
 actaaactgc tctaggagct agttgttacc atcaaaacga gtctaagact cataatctag 15960  
 ctgaagtgtg atgatgggta gaaggttaga gagggatcac agttctattg atctatgac 16020  
 aggcattaga ggccattgct ggtcaattcc tctgcaagc tgatatttcc agtgtgaata 16080  
 tctgtttatt ctggaatata gggacatcct ccagacacct cttggctata tgttaacaac 16140  
 taaggttggc acaggcaggc ttatagatgg ccagacacct cttggctata tgttaacaac 16200  
 taaagcataa gtaagagcca gaggaggaaa aacatttgga ataggtctat tccaaatgac 16260  
 atatatatag gatgatccat atatgtatat gcatgtggat gcatatggtc atggatggct 16320  
 tctgtccggag tctgatataa aggaaaaggt gtaatggaca gagaagaaaa tcagaggaa 16380  
 ccctttgatg aagagaatga aggtggatgg tgagggttaa gagctgatcc tgggaaggca 16440  
 gatgagaaac aggtcatcgt ttgctgtctt atcttgtctt ctctctccct gttgggtgc 16500  
 ttaataaagg actctgtgca gctacaagct aacaaagaca gtgcagagaa gtgcgttttc 16560  
 gcttcttagt tccaaggttc ttgaggactt tgtaatttat gggcatgctg gagtgcaggg 16620  
 ggcaaaagg aggtggcgga ggtatccagga agatgaggaa tgttctggca ttcaggaagg 16680  
 tcacccact gatatttcta gctcttctag caacctgatg tgaaaggaag cagagaaata 16740  
 gggcagatgt ccaggaattt aaaacctaaa ctgcttaaa gagagaaaaat agagaaaaaa 16800  
 gggaggaaca gccacacagg gtattctatg ggcacaagta aatgagtgc caagaagtca 16860  
 gtgttgctgg agagactttg tccaggtcca ctttggcagc tgacctccat tcacagatat 16920  
 tcaaggatgt gaatgaaaga gaatgagtgg ggttatctat ggatgttcca agagtattgt 16980  
 tcagaagctt gggtagagga ggccaaaata tttggagagg gaaggctact gaagctatca 17040  
 agaaagacag ctgcaaggat aggtattttac attacctttt tgtcattctt ttatttcttt 17100  
 tgaaattcag cactctaate agggctcatt tgcattgact tgcactcagc acacacttga 17160  
 gatcttccct gtgcttgggt tatacagggc cagtggagag catggtcaga tgtgacccca 17220  
 cacttccaaa gcatccttct agagactgcc tgaatcccta gagggatttg tcttagagga 17280  
 gtccttcaaa cagcctctgc ttcattgctc tggactttgg gaaagcatgt ttttgactgc 17340  
 tgctctagct tggattgaga gatgggtacat tcttgatgag aacctagta tatatgaaga 17400  
 tcagtgtatt agtccatatt cacactgcta taaagaacta cccaagactg agtaatttat 17460  
 aaagaaaaca ggtggccggg cgcgggtggct cacgcctgta atcccagcac tttgggaggc 17520  
 cgaggcgggc ggtatcacag gtcaggagat cgagaccatc ctggctaaca cgggtgaaacc 17580  
 ccgtctctac taaaaatata aaaaatttag cgggcgagggt ggcggggcgc tgtagtccca 17640  
 gctactcggg aggtctgagg aggagaatgg cgtgaacccc agggggcgga ggctgcagt 17700  
 agccgagatt ggcgcactgc actccagcgt gggcgacagc gagactccgt ctcaaaaaaa 17760  
 aaaaaaaaaa aaaaaaaaaa aagaaaacag gtttaattga ctcattggtt tgcattggatg 17820  
 gggaggcctc agaaacttac aatcatggcg gaaggtaaag ggggaagcaag gccgtgtctta 17880  
 catggcagca ggagagacag agagcaagtg aagggggaag cgccacactt taaaaacatc 17940

agatcttgtg	agaactcact	cagtatcaca	agaacagcaa	gggggaaatc	tgtcccatg	18000
atccaatcat	gtcccaccag	gccccctcct	cgacacatgg	ggattacaat	tcgagatggg	18060
atttgggtgg	ggacacagag	ccaaaccata	tcagtcagat	tccttggagt	caaacagttc	18120
ttgattctaa	ttccagcttt	cagacttgct	agctgtgact	taaagcaagt	tatttaactt	18180
tcccggtcct	ttttgtgtca	cttgtaaaac	agggataata	tctacccaaa	ggttgtcgag	18240
agcattggag	atagtatgta	aaatactgac	ctagaaagct	tccagtgggtg	atagctagta	18300
tcattatccc	tttttagtgt	cttagttttg	aggacagatg	gtcctttctt	ccttttctct	18360
accatggaac	ttggaaagta	taactatgtg	atgtgttggc	agtggctctt	gaaaagaggt	18420
tcctaaacag	aaggagttaa	atatcaggta	tgaagaggga	agggctgggc	caggggtctt	18480
gagagagctt	catgtcggtc	aaaggctggg	tagaactggc	tgggtgctcaa	cagaactgga	18540
cagtggttgc	tgtaactagc	acaggggctg	tggctctaga	catcaggagc	tacagcacat	18600
gaaacagaaa	tatggtttca	aactctgctg	cctgcaggct	cccattgctag	gcacccagag	18660
agcaggccta	agacatgggt	tctgtctcag	gggtctcaaa	ttcttaataa	gatgtttaaa	18720
atctacttta	aaatctactt	tcacccactc	tcagcactcc	ctccccactg	ctctttctgc	18780
tagtttctct	tctttccctt	tatttagggg	ttcctttgtc	caggtcctgt	tcccttttcc	18840
tttatttagt	tettacaacc	ctctctgaaa	tgttgcctcc	attttacaga	tgtggaaact	18900
aatggatggg	aagggttaagt	aacttgccca	aggttgtgct	ttaagattta	aactcaaaca	18960
tatcgatcta	accaagact	gcatttctatt	tttaatgttt	aggtagttgt	agtgggtagt	19020
ggatttttta	aatgtaacgt	cataatatgg	ctttttaaaa	agccaacagt	ttaagaggat	19080
atgtaagtga	aaagtaaatc	acctattcaa	cccaattctt	agttccctac	ctcctccagg	19140
aagctgtcac	tgttgccagc	tcacgtgtgt	cgcttccaga	ttctttatgt	aaaagtgcac	19200
atgtgtgtgt	gtgtatgtgt	gtgtgcacac	acgtcaccat	tctgcatctt	ggttttatct	19260
gctaaagaac	acttcttcaa	gtcattctcc	atttcagcat	tcttctctct	tctttttcat	19320
agtcacagag	tatttatatgg	aggttctgtg	agataagaaa	ccagtgcctg	gctgggcacg	19380
gtggctcatg	cctgtaatcc	cagcactttg	ggaggccaag	gtgggtggat	catttgaggt	19440
caggagtctg	agaccagtct	ggccaacatg	gtgaaacccc	atctctatgt	aaaatacaaa	19500
aaattggcca	ggcgtgggtg	cacatgcctg	taattccagc	tactcgggag	gctgaagcaa	19560
gagaatcgat	tgaacctggg	agccagagggt	tgcagtgagc	ccagatcgtg	ctgctgcact	19620
ccagcgtggg	tgacagagtg	aaattccatc	cagaaaaaaa	aaaaaaagaa	agaaagagag	19680
aaaagaagga	aggaaggaag	gaaagacaga	tagacagaca	gatagaaaaga	gagaaagaga	19740
ggaaggaagg	aaggaagaga	gagagagaga	gaaaggaag	aaagaaagaa	agaaagaaag	19800
aaagaaagaa	agaaagaaag	aaagaaagaa	agaaagaaag	agaaagagaa	agaaagagaa	19860
aagaaagaaa	ccagtcctct	gtcatggtca	tttaggttcg	gtctttggct	tctccagaca	19920
gagctgcagt	aaccaccatt	gcgcccatgg	accgatctac	ccacaggata	aatacctgga	19980
agtggcttta	ctgcgttaaa	atgtctgtgt	gtttaacatg	cttcgcattg	ccaattgccc	20040
tccaaaaaaa	aaagtctgtg	ctcttttcta	cagtgtcaac	catcctttta	tgttttttta	20100
aaccacactg	aggagaaccc	cctgatgctg	cctctcacat	acatgtaggc	ccctacatca	20160
tttgatgtag	gtctttttat	tccttttagat	ttgtggggt	ataattgaca	gatagacatg	20220
gtctatattt	cagggtgcaca	actegatgtt	ctgctataca	tatacatgtt	gaaatgatca	20280
ccataatcaa	actagtaagc	attcccagca	cctcacatag	ctttcagatc	aggagctctc	20340
gctagtctct	gtatcctgag	cagacgctgg	aatctctgtg	acagtgcagt	ggagatggag	20400
cccagagggg	atagttgacc	ctacgcctgg	gttatgcaac	gtgcgtctct	gctggcagag	20460
gccacctact	ggagaaaggc	ccaactgtcc	caggcctgag	gccctggccc	caggctcttg	20520
atgcttttgt	gaggtttttg	tctctttctg	ttttgataaa	ctggctctctg	gcattgagaat	20580
cgggtcaatgt	cctctctcac	ccctggcttt	ctagaaactg	catctatatt	tagcttgggt	20640
gccccacccc	tacccccctt	tcctgagctg	gggtataaat	gccaaccaac	cagaggatga	20700
caggggtccag	gctcagagag	cagctgaggc	aatgggctct	catggaaacc	tgaagctctt	20760
gtttctcaaa	tccaaaccag	ctcacaggca	attagtattg	ggaggaaggc	agggtagggg	20820
gtagaccttc	aggacaaaagc	acagagccag	ggttgggcag	tctggctgcc	ctgactcttc	20880
gtgggcagag	agtaaatgac	agccacacat	gtggaagtgc	ccttgggaagg	caggagaaca	20940
gggaagaaca	ggacctctga	gccaagagga	ctgttggecc	agcaaacaga	catgttgggc	21000
cagacacacc	tgaaaggcca	gtctgtggat	cgtagtcca	gagagcctct	gggtctggca	21060
gttgagctg	gggagcaaac	ttctataacc	ctgaacactg	accccacgct	ccagagcgta	21120
atggtgtcct	cttcttttct	agtgttctcg	ggcttcatat	gacaactctt	aagcagaagc	21180
aagggcgcca	aacttttttt	ttacccccag	tactttctct	tttatttttt	atttctagag	21240
acaggatctc	actttgtcac	ccacactgaa	gtgcagtggc	acaatcttgg	ttcactgcag	21300
ccttgacctc	accagctcaa	gcgatcttct	caccttagcc	tccaagtag	ctgagaccac	21360

aggcgcacgc caccatgcct ggctaatttt ttttaattctt ttgtagatac aggggtttcac 21420  
 catgttggcc aggttggctct caaactcctg agcctaagct atctgcccac ctcagcctcc 21480  
 caaagtgcct ggcttacagg cgtgctcagc ccactgcacc cagtcaccagt actttctctt 21540  
 aattcagctc tgcactatct tctcttctta ttcctttttt tttttttttt ttttttttga 21600  
 gatggagtct cgtctctgtcc cccaggctga agtgtagtgg cagcatctca gctcactgca 21660  
 agctccacct cccgggttca cgcattctc ctgctcagc ctcccagta gctgggacta 21720  
 caggcgcccc ccaacacgcc cggctaattg tttgcatttt tagtagagat ggggtttcac 21780  
 cgtgttagcc acaatggctc cgatctcctg acctcgcgat ccgctgtct cggcctccca 21840  
 aagtgcctggg attacagggtg tgagccaccg cgcccgccct tctcttctta ttcctagcct 21900  
 cattctctgt gtcaggcaaa gtggggctga gtggcaatct ccaaccctcc tgcgtataga 21960  
 catctgagat ggagcttcat atttaaagt acatgagaaa aatgagagaa agatggcgaa 22020  
 gcagtggaaat ctcttttcag gcaaccctgc agctgggggg gctgccccca agtgagggtc 22080  
 aaaggcaggc tccctggagc ctggggaagg acagacgggg cctctgatag gccctggggc 22140  
 ctcaagaagc tctcagtcct gggccagtc tggtagagg ctttggctca catcactgta 22200  
 ggtgggtggc gggctaggct gacgatgtgc tgtcttcttg gtgcccattg ccttgcaggc 22260  
 ttaacaggaa gagctctgag ccagacaaga cagccagtgg gaggacagag cagccccctca 22320  
 gtgaccagag cgaaatgccc ggttgttgaa aaacaaaaaa aaaaaaaagg aaatgagagt 22380  
 ttcttctgaa atagaaactt ctggtccttg agtaagttaa gagaattacg ggcattctga 22440  
 ggctgagca tttgtgggtga cggatgaagc ctcaagaacc acaagggttg tgggaggggc 22500  
 accaatctca tgtcctggaa catacagatg tccctgtggg gataattgta tctcgtttct 22560  
 ggggaacctt aacagtctcc aagatgcttc cgtattctct tgtccctcca gaaaagcagc 22620  
 agtaaacaaa tagaggtgaa cggcaaaagg ctttttgggt ctacgaagat ggaaaaagc 22680  
 ctggcgataa acttctttct tgttagctac tgcagggtta ggactggggc tgaggcgggc 22740  
 tagacttggg gctaaggagc cctgatagc ctggtgctgc tccacctcct gacaacctg 22800  
 gctctgcagt agggcccttg ggtgatgagg gttgtcacag cagggtacca gagccaaggt 22860  
 ccaaaaccaa cagcagctgc ttccttgact gttgggtcat tcttggcatt gagccacctg 22920  
 gggctgtttg gggcatcaac ttcactgagc actttaagtt tctggggttg aaaacaatcc 22980  
 aggaagctaa aggcctaagc ttagatccct aagacttcca gacctaggag cctgcacttc 23040  
 ttgctgaata tctcactctg taagtctctt aacctcagt gtcccacgta taaaggagg 23100  
 gagttacact gacggtctct tgggccctct gtggatctaa gactctgggc ctgcttggga 23160  
 ctgccagtag agccctactc tggctctctc tctatcccag gggctgagtc ggtgtgtgtc 23220  
 ccagctgtcc atttgctaga gcaagcttga caattgatga gtgcgattcc cctcaacccc 23280  
 atgtatgttc tagtgaatgt gaacagttag tcatgtttta ccaagaatcc taactaatgc 23340  
 ctggccctct agcagatgac gtcagttagc catctccagg aaggaaatgg ttgggcctgg 23400  
 gctttggctt ggaaggcttg ggcacttca cactcagcag ttccttggaa gatgctgctg 23460  
 gctctcaga cagtattct gccacctct tccccatct aactatgtca gaaaagtggg 23520  
 cctactcct gctggggctg ggaggaggac aggaactctca ggacatggat gatgaaaagc 23580  
 ctctagggag gtgctcagg gaggtgtcct ttatgcagc tcccaaagtc cactgtgtgt 23640  
 ggctggcagt gggagagaat gtctgaatta ggaaaatgag cccttaaatg tgcacacttg 23700  
 tgcacacaca cacacacaca cacaacttac ataggctaca aggggtgccac tttctttttt 23760  
 cttttctttt tttttttttt gagacagagt ctcatctgt tgcctaggct agaattgagt 23820  
 ggcacaatct cggctcagt aaacggccgt tcccaagtt caagtattc tctgctca 23880  
 gctcccag tagcggggac tataggcatg tgccaccgt cccggctaatt tttgtattt 23940  
 ttagtagaga tgggttttca ctatgttgtt caggctggtc tcaaaactct gacctcatga 24000  
 tccaccacc tggcctctc aaagtgtctg gattacagg ctgagccacc acaccagcc 24060  
 tcaagggtgc cacttttcta gctaagaaca cttcagtagt tttctgggtt tttttgttt 24120  
 tgttttgttt tgttttttga gacagggtct tgcctgttg cccaggctgg agtgagtggt 24180  
 catgatcttg gcctactgca acctctacct cctgggttca aacgactctc ctgctcagc 24240  
 tcccagcccc caagttagct ggactacagg catgcacat catggccaac taatttttgt 24300  
 attttttagta gagacggagt tttggcatgt tggccaggct ggtctcaaac tcttacctc 24360  
 agatgatccg cccacctcag cctctcaaag tgcaggatt acaggcctga gccactgtgc 24420  
 ccagctctag tttctgttct ctacagagct cctgtctcct ctctcttca aaaaacccaa 24480  
 ggccaggcct caggatttcc acctgcttgt ctggccctct ctttttcttg gcagggtctg 24540  
 ggatgtctag agctatggtt tgggcctttt ctctcttcca tgtacacatc tatccctgga 24600  
 acaggagcta ttccagtcac aggtctctag aatctagaag acttcatgct gagactagca 24660  
 tcttacttcc tcatagcggc tcattaaatg ttattatgct ggctactctg gagatttcaa 24720  
 tatttaaaaa ggtttctctg gccaggcaca gtggccttac cctgtaatcc cagcactttg 24780

ggaggccgag gcaggcggat catgaggtca ggagatcgag accacagtga aaccccgctct 24840  
 ctactgaaaa tacaagaat tagccgggtg cggtggtggg cgctgtagt cccagctact 24900  
 cgggaggctg aggcaggaga acggcatgaa cccaggaggt ggagcttgca gtgagctgag 24960  
 atcgcaacac tgcactccag cctgggcgac agagcgagac tccatctcaa aaaaaaagg 25020  
 gttttttcta gggaaatgca cttttgttat ttctgttta attttttaaa atgggaaggg 25080  
 gaacagagta ctgtaaaata agtataagag tcggggcggt gctgtgcgag atgggtcacg 25140  
 cctgtaatcc cagcactttg ggagggccaag gcaggcggat catgaggtca ggagatcgag 25200  
 accatcctgg ctaaacacggg gaaaccccat ttctactaaa aatacaaaaa aaaattagcc 25260  
 aggagtgggt gcgggcgcct gtagtccag ctactctgga ggctgaggca ggagaatggg 25320  
 gtgaacccgg gaggtggagc ttgagtgag ctgagtgagc cactgcactc cagcctgggt 25380  
 gacagagcaa aactccgtct caaaaaaaa aaaaaaaaag agtcggagtg cagtggctca 25440  
 cactgtaat cccagcactg tgggagggc aggatagagg attgcttcag cccaggagtt 25500  
 ccagactagc ctgggcaaca tagtgagacc gctatactgg aggtgaagc agggagatta 25560  
 caggcatggg ggatgaccc tgtaatccca gctagatca tgccactgca ttccagcctg 25620  
 ctggaaccca ggaggtccag cctgagtgag gctgagatca tgccactgca ttccagcctg 25680  
 ggctacaaag caacaccctg tcccccaaaa agaaacaaaa attaaaagaa aaaaggtaag 25740  
 tacaagccat gattggagct gggcaggcaa tgaaggaga agtaggaatc gtttggggcc 25800  
 cagcctagag gtgagagtga ctggcagctg ggggtggcct catgtcttct gttggagaaa 25860  
 tggagaccag ggggcccaga agacaggtct ccgtgatgac agggtgagga gccgggaagt 25920  
 cagtaccaca gggcagggtg tgtgctctct cggcaggcga agcatgaagc ggaaggcact 25980  
 attcacctgc cccttcaacg gggactgcg catcaccag gacaaccgac gccactgcca 26040  
 ggctggccgg ctcaaacgct gtgtggacat cggcatgatg aaggagtgtg agtgtccagg 26100  
 ggctggccag ggtttgggct tgaagtggag tcagggaag gccttggcca ctctctgca 26160  
 agtttgggca gaggtctgct ctgcccttcc tctgtagctg ccagcatctg gggccagggc 26220  
 ctgagtgagg ccagcagctg gtgacagggc agctggaagt ccagggtcag atgcactcag 26280  
 cggccctgtg cactcttga ggatctgtgt gttggtgtca gaggcctgg aagggtccct 26340  
 ccagagtggg gcctgagagg aaggagaggc cggacactgc cttcaagagt cccttctact 26400  
 cctgggtcag ggtcttctc tcaaggaccc ccagggttcta tgggcttggg aagagagggc 26460  
 cctagaggga agaagagggt tcaaggaccc ccagggttcta tgggcttggg aagagagggc 26520  
 tgatgtgggt taggaagggc aggagtgatg gggagaatta gtattcagag catagttggc 26580  
 atccacgttc tgtccaccc cagcctccca gcctctctg gcctctgagc agatctgagg 26640  
 gcttgtgcca gggagagacc aggaggaaa agtctgccc ataggacttc ctgtccctct 26700  
 acgaccctct gaatccagat ggagaaagag gatgtattct ataggacttc ctgtccctct 26760  
 ctgggggttg agaagaccaa catggcatat ttacatggat attttgacc atcactgaaa 26820  
 acaacacttg aactttgcat cagagctcta ggacagttat ttggtaacta gtagtaggcat 26880  
 tgaattcagt agatgctggg agggggccagc ctggccctct ctgggctgga gcaaggccag 26940  
 ctgggcatgg gtgctctctg tacactcatt cctttttctc cttctcttgc tcaactcctg 27000  
 ctgccatctg catccagacc cccacccggc cctaggacag aacccaggcc ctccctagct 27060  
 tgggtctgag gaatccgagt cggagtcggg gtggggatgt tgctcagatg cggaccctcc 27120  
 tggctatggg accgtttgga gtgggtgggg atggggagag gtcaggtaac aggaagatgt 27180  
 gtcagggaca gaggataagt cacagaacag ggcttagagg atagcaaatt tctccgttaa 27240  
 tgggaaaaaa attatctgtt gttgggacac agaggcagag ctgaggccct gacctggggc 27300  
 ttctcttttg ggccttgacc taggcttctc ttctgtgggt catgactcct cctcctgat 27360  
 ctgacggctc cccagccaac actggcagcc ctgaaagggtg tttccagggc tgtggtttct 27420  
 ccacaccatc acagggtgca ggcctgggca cgctggtcgc tectacccta gtcctgcca 27480  
 cgccctggct cctgtgttta tcctggagag aataagaagt ggaggctgga ggcccggtg 27540  
 ccttaagagg ctccacacac attctcagtg ggcctgctc aggggtgagg gttaggggtg 27600  
 gcaccaacaa ggtgtgctca gcacagtccc atctccgag agaagacagc ctctgcaaag 27660  
 caggaggtcc ggtttctaaa gctccagcta accaagactg gcacaggtt ccaactgcagt 27720  
 ggttcgttaag gcactgccac aggagtcccc ctcaggacta agctcactga tgcccaagag 27780  
 gcccctctcc tacctcagga ggaagaggat gtcttactga cttaaaatag aaagaacatc 27840  
 tgagactcag agaggtaaa acctcagggtc tggggtcaga aagcaagttg gtggccaagc 27900  
 tgggactaga atcagacttc atgtccctc ctacctgcct cctgggtccc cagggggccc 27960  
 ctgcatccat ggtgaagagc agcaccagcc tggggtaaat cagggggccc tgcccaggag 28020  
 caccctacca cgtggtggga acccagcagc ccagaagcga tgccacccc atccctcagc 28080  
 cagcccacc ccagcctaat tctctcctgt ggagtccgtg gtcccatcc tgctgtatgc 28140  
 ccaaggtagc ttctcgccac accaccctcc tcatccaggt gcaggagca gtactcagtt 28200

ctagatgggc tgggtggagcg gggatccagt taaaatagaa acgtcctgat gctttttact 28260  
 ttccctgaagg gaagactgtc caggaagaga cattcccagc ctcagggttag tccagcttca 28320  
 ggaggcctca ccagtgtgaa gtcccccggc ctcagaaccc tgggagagct gcacatttct 28380  
 tatctgggct ggggtttgtc cccaaggcat agcatcccag agacaattga gtgtctcaat 28440  
 atttgtaaaa ccacaggaag aaagctaaaa gccaggtc ctgctgtccg agcaaggagg 28500  
 tgggccttcc atagaagagg cacaggaagg gaaaggatga ggacagaaac cctgtgtatt 28560  
 gaccaactac tgtgtgtcag atagcacatc aagcacatgc attttcttct gaaattctca 28620  
 caacactccc taaatacgt aatactttta ttttttcaat agctgaggaa gctcagagga 28680  
 attaaaaat catggctctc agctaataag atgatggat cagcattcat tctaactctag 28740  
 gtctttctgc ttccaaaggg caggcttgtg ggccacaccc gaggcagcct ctcgtggccc 28800  
 cagtgggtcg gagctcactc catttgtcat ttccaggcac tttcacatgc tctaagagat 28860  
 ggattgaaga gagcttggtc ccaccaaaaga ctcattttct ctcttttcca ttcttagttg 28920  
 actttatacc ctgggaaccc aagaaatttt ataactgagt tcttgctttt tgcttatact 28980  
 attacctgtc ctgcacagaa ccacacattg tggtaacttg tttgatgttt ttacagatgt 29040  
 atgtcttttc tccctgggtg tagtaaaagt cctggcacat agtaggtgct caataaatgt 29100  
 gtggaatcaa tgaatattag ctctcatta tgcttcttct tctctgtata tcttccacag 29160  
 gtctatagat cagtaagatt ctcccaaacc tgatcatgtc tgtgccgttc atttggaac 29220  
 attttatgtc ctcttctgt ggttgttctt agcccatcct tggcatcttg aaatgttttc 29280  
 aaattgttta tgttgcat ctgtgcttcg ttaaggagag aacatgtctt gcatgggaat 29340  
 aacttgcgca aaattatttc acactcagca aggagcttaa aatgaagtca aaaaaagcct 29400  
 ctgagcagcc atgtaggttt taaaaagtcc acatgccaaa actcatgcac tttagacgcc 29460  
 tgatcaccag acagcccaac actctttcag aacctgttta ctcttattct aggtcaatgg 29520  
 ctccatata catatagtgt ctctctatat gatagtaatg acatcttagg ttcaatccat 29580  
 tgaaaaaatg ataagaaatt tcccatgaaa ttaacaagat ctttaacaa attatttctg 29640  
 aaatcacagt gcatttgc atgtgaaaga ctttagactt attcagtcct caagcaatgt 29700  
 tgccctgcag aaggctcatg gattgggccc gtgtgaaact ggtagatctc agcatttctt 29760  
 cctctgttac tcccatagaa gatggagggt gctatttgat gcaagtgact gggaggaatc 29820  
 atgttatagg gttaaacttg aactttcttt gtctctttaa agtgggtaat ttacaagcct 29880  
 tgtgacttaa ttttattttc acactcttca gatggattgg aacacaatgc ctgtcaaac 29940  
 tccatggctg aaagccaaag tccgcttata accagatgta atcagacaca gtagaggcta 30000  
 gtggttatga ccttccactc cagaaccaga ctgcccagggt ctaaagtctg gtttcaccac 30060  
 tgttagctgt gtgactttga gaaaggtaga aagcctctct gggcctcagc tccctcatct 30120  
 gctaaatggg aataacaaca gcacctgcct taaaggggtg tcatgagggc taaatatatg 30180  
 agttaatata caaaaggctc tcagaatagt gccttataga tagaaaaact ctttatgtgc 30240  
 catccagcat tacgaatatt ttctttttat tacatcaaac ttgatcacca gaacttctag 30300  
 ctcccaagag atcagaagta agtcttaagg gggagaaagg cacacatcca gaggcagaca 30360  
 ccaataagaa gacaacgc atgttaacag ggagggtggac actggaagca agaaaagcag 30420  
 ccaagaact ccaaaagccca gcacgccaag ccatgcaatg cggggcagac agcctctgac 30480  
 aactctgagg ctgtaacctt gtcctgcaat gttcagtaat tattcagaat gatacctctg 30540  
 aatcatcagg gaaaggttat atgacgttaa aagtgttccg ttacaagggt ttctgtcttg 30600  
 aaaatcttcc catacaatt gtttcaataa aagaggtcag ctttctcagc tctctgtgtg 30660  
 gccagggtgcc attcactaca ttgcaggaga caagcagcac tagagtactc actagccttt 30720  
 cctgaaccag gaaaaatgatt tgcacacagt tgggtgtaatc tgtgtggatg catttgatat 30780  
 ttgggtgcag actattgagc agacaccacg gccaggtagc cctccgggtc tagcctttat 30840  
 gggggaaata taagaattgt aagacaaagg ccgggcatgg tagctcacgc ctgtaatccc 30900  
 agcactttgg gaggccaagg cgggcagatc acctgagggtc aggtgtttga gaccagcctg 30960  
 gccaacatgg tgaaaccca tctctactaa aaatacaaaa aaattggcca ggcaggtggg 31020  
 catgtgccta taagcccagg tactctgtag cctgaggcag gagaatcgct tagaaccggg 31080  
 gaggtggagg ttgcagtgc cggagggtgt gccactgcac tccagcctgg ataataagagc 31140  
 gagagtctgt gaaagaaaga aagaaagaaa gaaagaaaga gaaagaaaga gaaagaaaga 31200  
 aagaaagaaa aagaaagaa gaaagaaaga aggaaggaag gaaggaagga aggaaggaag 31260  
 gaaggaagaa aggaaggaag gaaggaagga agggaaagga agggagagaa aagaaagaat 31320  
 tgtaagacat ggaccctgcc cttaagtaac ttgtaatcta gagaaagaga ccttgaactt 31380  
 cttgggctcc gtctataggt aatgaattga aaactgtgct aacctagagt cttacagagc 31440  
 agaagataat tgggtgtcaa tgtgtgtggg aaagactaaa tatgtagcag gcataggaaa 31500  
 tgaggctcag cagaaaaaaa caaggcttga tgcagatcag ggcaatcaag aaatgcttca 31560  
 tggaaaaaga tggctatgat gtaggcactg aagaactggt agaactcata cagggttggg 31620

ggagagaaaa cccagctgga cgggcaccta gcacaactgg aaatgcaggg gcgagcatga 31680  
 gcaggtcatg tcccaggcc agcagcaatg ccagcatgcc cagaacagag gctgtgtcca 31740  
 gaagcactaa gacatgaagt ctgaaagtta ggaagaggcc aactttagtt tggacgtggt 31800  
 catcagtagg ggccgagaaa agtatctggg caggagaatg gcatcacaga atcactggaa 31860  
 agttagcaaa gtccagtcag gctgagctac gtgcctgtag acaccatggt gtggctggca 31920  
 gaaacaggtc tccctaactc tgggtcccccag gtgagcagga aagacaagac acctaattctt 31980  
 gggctcccca agcgagggct taccctccatt gccttccctg gatgctccct gcccttctct 32040  
 ctccaccctt gcctgacctg gtagggctctg tgcagacacc cactgtggga ggagagttgg 32100  
 cagctgtttg ggcaggtgag tcagtcacct ggggtgtggc tactcccagg ctccctgtgg 32160  
 agggaaagcac catctcttgc agtagcgctc gctttcctgc catgctgtg gcattggctg 32220  
 tccactccct cccagcatag gctcttctc accccacagc aacttctctc gtctctcccc 32280  
 tacctgaggg cctgggcca tggacctttc tcaaagcctg gaactcacc accctgggct 32340  
 tctggttctt tctctgtctc ttgtgaaact cccagttct gtgggcagat gccctggcag 32400  
 cagcagcacc aagcaagtag ctacaggcca aaggccctgg tgccactcc tgccgtcagc 32460  
 actcagcaag ccacagccag gaggtctgtt tgccagccg ccgtgccagg cacctttgct 32520  
 cccagcatcc cctccacccc cacagctgcc ccagcacagg gaggcaggca gaagcctgca 32580  
 ggtgtgtgtg gggctctcta tggccccaca cctgattag tggctggaga gaacttctaa 32640  
 gattagagct gcaaggcctc accctttggg gccttcaaga ggacttgaaa acttccatgg 32700  
 acagaaatgt caaggtctga catgctggag gagggtgtgt tttgcagaga accaaagagg 32760  
 tctagtcttt ctatattcca cagtccatg tctggaaacc tggatgtgga gacagccaca 32820  
 tagaggagtc ctctccacat ctcaattcca gcgtatgag agctctggca tctctctctc 32880  
 accctgatat cttcttcagg atcatggaac atcagggtag ggaagagaag agaactaaca 32940  
 tttagttagc atctgtctg ggcaggcat gcatecagtt ctcaaactag ttgatecttt 33000  
 gaggcaggta ttattacttc cccacctgc atgtcaacac acacagacac acacacacac 33060  
 actttatgga ggaaggtaca agaaaggaac cttggaagaa cttacatggt ccaaactctc 33120  
 cattttaca acaaaagaac aaaagcccag agagtttggc caaggtccca caactgttct 33180  
 ttgagaaccc cgaactcccta aagcccagat cateccctct ctcaaactct ctttttcttc 33240  
 ttcttgcatg tgccttctct ttcaccatag caaacccaat tttcttctac acagtggagt 33300  
 gggagtctcc gtggcaggag gacccccgag ggagccccga gtgttaaagc cctctctatc 33360  
 ttggaccttt acccccaacc gcaggaggaa ggtttcctgg aggagctgct ggccagccct 33420  
 cctgactccc ctcccacccc cacagtcatt ctgacagatg aggaagtgc gaggaagcgg 33480  
 gagatgatcc tgaagcggaa ggaggaggag gccttgaagg acagtctgcg gcccagctg 33540  
 tctgaggagc agcagcgcat cattgccata ctgctggacg cccaccataa gacctacgac 33600  
 cccacctact ccgacttctg ccagttccgg gtatgtctgc ctgctgggag gatgagccgg 33660  
 tccagaggag aagcactagt ggagccaggg cccaggaggt agggacagag ggagggggac 33720  
 atctgaaca gaactggggt agggacggag gctgctctgc ccctggcact gggaggcttc 33780  
 gccttctgt agaccttct caaagccatt cctatcagag atcaggggcca aggtaggaa 33840  
 gcaaccccaa aatgtgggtc tgagacccca tcttccctt ccagcctcca gttcgtgtga 33900  
 atgatggtg agggagccat ccttccaggc ccaactccag acacactccc agcttctctg 33960  
 gggactctc ctctctctgc tcagatcact gtatcacctc ttcaggtaag caggacttca 34020  
 gtctccata gagtaaggga gcggggggcga ggagtcacc gcacctgccc tggggctgct 34080  
 ggatggaagg aggtggaagg ctccctaatt gaaacttaca taaatactgt gcgctatgca 34140  
 gcgtcttcac aacagccctt ctgttacaga aagggtgac ttacccaagg gccacactg 34200  
 gggaagaggc caagctggga ttccagctgt gtagcatcag cctcccgggc ccatgctgtt 34260  
 tctctaaagc caggcttcag cccatggccc cctccgtgga ggtgacctgc ttcctttacg 34320  
 tgatatttta atcctgggccc cttcagaagg tgaattttgg agtgggaagg tgaactgtgt 34380  
 ggtcctattg aggtccacct tccacttgag ctctggggac cactctggcc ctggaggacc 34440  
 tgtccctcc agctcagctg agagtctggg aggcacatg ctttccctcc tttctttttt 34500  
 ttttttttt taaaaaaaac acatatgtat atttagaaa gaaattgtgc tgtatacaat 34560  
 ctgatgactt gcttttttt atatggcatt gtttttccat accagttagt acgcatccag 34620  
 aatataattt ttaagggtct catagtattc tggaatacaa taatgtacct aatccctac 34680  
 cattggatat ctggattatt tctcagcatt ttaataagaa aacagtatac ttgtagccaa 34740  
 atatttacac ttatcgaaa ttttccctta caatgaattc cagggaagtgt gactactggt 34800  
 caaagagtac acacaattat ttgactaatg tcaaatagct ttctagagta ccttcagtaa 34860  
 tgtgcacctc ctttagcacc ccagccctca taggcattgc ctaatttctt gcatctttat 34920  
 aaatactggc atcaatattt aaacattttt gtttctgggt tgtagggtga aattatagat 34980  
 gttctacact gcagttcttt gaccattagc aaggttgaac attttttctc atgacttgat 35040



```

gggtcccaaa ttctttcttg attgagatcc ataggaacag cacacagtct gcttgaggaa 35100
gtctcattgc tctgagtgtc tctggctctt tgattttact gccttatgct gctgaaagag 35160
gcagagagag tcccagaggg aagcctgggg ctgaagggtg acctgtggag tcaactgtggg 35220
attcccagct ggctctgctg ccagggcaca ccagggtttt gcagggtctg gcaggagggg 35280
gcctggteca agtatcctta aatagctcct tctcttccct catctctccc agacatgatg 35340
gactcgtcca gcttctccaa tctggatctg agtgaagaag attcagatga cccttctgtg 35400
accctagagc tgtcccagct ctccatgctg cccacactgg ctgacctggg cagttacagc 35460
atccaaaagg tcattggctt tgctaagatg ataccaggat tcaggtaaga aacttctgca 35520
atctctgggg aacagagtcga gagtccatga ctgagctaca agaagggttg gagatcactc 35580
atccaccact tctttttttt attttttatt tttttaaacg gcatcttgct ctgtcacgca 35640
ggctggagtg cagtggcgcg atctcggtc actgcaacct ccgcctccta ggttcaagcg 35700
attctcctgc ctcaacctcc caagtagctg ggattacagg caccagacac cagccccggc 35760
taattttatt atttatttat ttattttatt attttttatt tttttccaga cagattctcg 35820
ctctgatgcc caggctggag tgcagtggca cctacctggc tcactataac ctccgcctcc 35880
cgggttcaag tgattctcct gcctcagcct cctaagtagc tgggattaca ggtgtggggc 35940
accaagcccg gctaattttt ataattttat tagagacggg gtttcaccac gttggccagg 36000
ctgctctcga tcacctgacc tcgtgatcca accaccttgg tctcccaaag tgcgtgggatt 36060
acaggcatga gccatcgcgc cctgcccata tttttttatt tttagtagag acggagtctc 36120
gccatgttgg ccaggcttgt ctcaaaactc tgacctcaag tgatccacc acctcagctc 36180
cccaaagtgc tgggattacg ggcatgagcc acagcagcca gcctccattg cttctttaaa 36240
atagagattc agacctacc ctgacctgc ctgacctgca tctctggcgt agggccagaa 36300
atctgtattt gaaaagtga gctgtcttg cgttactctg caggccagca ctggagagct 36360
agtccatccc cgactttct ggatgatggg gtggaagccc agagaggtcc aatggccagc 36420
caggatccct tccagggtgt ggagccagca tgcagagcc aggcctagaa ctcccagctc 36480
actgctgtgt tcactccagc tggcttgact ggaatcctca tattatctct ttaaattcaa 36540
cgatatgatt cctccacacc ccaactctga gacgagaatg aagtgataga gagaagggct 36600
tggccatgta gacttgtgaa acagtctagg aatcctggag agagatagg ttactggcat 36660
atatgacctt ggcatccttc accaaaatgt accatttaaag accatttctt ggctgggcac 36720
agtggcacat gcctatccca acactttgag agactgaggt aggaggattg cttcagccca 36780
ggagttccag accagcctga tcaacatagt gagacctctt ctctacaaa aaaaaaatt 36840
ataaattagc cagggtgtgt tgcacatgcc tgtagtcca cctactaggg aggcgtaggc 36900
aggagaatca cttgagccca ggaggtcaag gctacagtga tccatgattt caccactgca 36960
ctccagcctg ggcaacagag caagacctg tctcaaaaaa gaaaaaata aagaccattt 37020
cctaaccata ctgatacatt tttgccaaa tatataagta taaggagttc tactggagaa 37080
gggatcctcc tttatcaatt cattcatata aatttcattc atttattcct atgtttcatt 37140
gttttaacac tagtactgta tataatactt atatttaaact actcatgcag tgttaatttt 37200
ttttttcttt tttgagacgg tttcgctctt ttcacctagg ctggagtgc atggcgcgat 37260
ctcagctcac tgcaacctcc gccttccagg ttcaagcaat tctcctgctt cagcctccca 37320
agtagctgga actacaggag cgtgccacca tgcctggcta attttttcta ttttttttga 37380
gacagagttt cctcttgtt gccaggccg gagtacaatg acgcgatctc aacttactgc 37440
aacctctgcc tcttgggttc aagcaattct cctgcctcag cctcctgagt agcagaaatt 37500
acaggcacgc accaccagc ctggctagtt ttgtatttt agtagtagag ttgggggttc 37560
accatcttgg ccaggctggg ctggaactac tgacctcagg tgatctgcca gcctcagctt 37620
cccaaagtgc tgggattaca ggcatgaacc accacgccc gccaatattc tttttttttt 37680
tttttttaat tgaggcagag tctcgctctg tgccttaggc tggagtgcag tggcatgac 37740
tcggctcact gcaagctccg cctcccgggt tcacgccact cctctgctc agtctcccg 37800
gtagctggga tgacaggcgc ccgccactac gcccggttaa tttttttgta ttttttagtag 37860
agacagggtt tcacctgtt agccaggatg gtcttgatct cctgacctcg tgatccgct 37920
gtctcgccct ccaaagtgc tgggattaca ggcatgagcc actgcggcc aatattctta 37980
aaacaataga gtattgacac atttaataga tgtgttggga aatggctata tttatgtata 38040
tttgtatctt cattcttccc caaagttcat ttggtatatt gccataaaat acataaaca 38100
tatggttgag aaagagaagt aaatcaatct caagcaatgt tattgtcttt caagtagcag 38160
caatagctgt atttacggca gaaggggcaa aatgcttctt agatacta at gctcagattc 38220
agtgtggaa tatggggagc tggaaaatga gttaacattg ccggctctgg atggaaacag 38280
attatgaggt gccatatatt ggtgtatggc cctcttagct gtgtagaaaa gccatgagtt 38340
attgccgaaa ttaatgcctt gccagtga gctgtgtcat tcacagagct aaaccagaa 38400
ctttccagtt tgtttctgcc ctgagaaaac tggctctgtg ttattttatg cctctacca 38460

```



acccaataa cagaaat ttcgatgctct tcccctggaa ttaatgtgaa aatgggtgaag 38520  
 aagagaaaac tggcagacag tgctgagaca ctctactgc attgcacatt ttgggtgtag 38580  
 tgataggagc gagggccct ctggcaggca ggcaagcagc agatcttgtg 38640  
 tgagcccggc attgctctga gccagggtt taccctcaga ggctttcttt ggaactgaca 38700  
 acacattccg tagagcaca gttccaactc cctctccac gcttcacgtt actgtttgca 38760  
 aactccacat attccaaagt cttgttttgt gtaaacagct agggaaaaaa cacagaagca 38820  
 ctggcttcc atcctcatgt caggcagcag tcctgtteta cacaggcttc atccttccct 38880  
 gctctagtgg ggagtaggac agagggcccc caccggccct tccagatata gtgattccag 38940  
 gttcagtgat tccaatggtg gctgagattg catacacggg aaagctgccc taaaaagaaa 39000  
 gttactcatt aaatcggtt actccaatgc tgcccccttc actaaggaaac cccagcctcc 39060  
 aatttctccc atgctcaagg cccctatcca taagtgtgag tctgccccct tcttttcatc 39120  
 agcactactc tcagtttctc tcccagagt taagtgtgag tctgccccct tcttttcatc 39180  
 atgttctcct ctgtccccct gtctgtcctt gcaactcatg gctaaagtga ggtacatatg 39240  
 gcaggtacag gagctgccc gccattgatg caaatgtggg taaactgatc ctgaacatgc 39300  
 tagggttggc ttctctgtct tcagtatgac ttgagaagtc ccagagcaga aggtatgcca 39360  
 atgaaaatgg agcaggcctt gctaagagag cttgcaggga cactgggtatg gacgtctctc 39420  
 gtgactggac agagggtgat ctgagcctgg actggagccc aaacctaggc tccaactggg 39480  
 cccagggtgg gccagcccag tagctctctg gttctgctgc tttccacact taggggttct 39540  
 attgttccaa gacatagaag aacagtggct gcatccctgg tggtttgatc cttgctgcct 39600  
 gcaggcaggg gcgagggtg tggggaaggc aggatgagac ttctgtgtgg gtgtgtgggg 39660  
 gcacaggatg agtctccagt gggggcatga gaccaacgtg gggcagggtt ggatgggctg 39720  
 ttcttggtgt gaactgtgct acagtgtggc cttggcctgc tctctctcc catctctcct 39780  
 cccttagcct ctgagtctca cccacaaaat ctccctccct gctggcactg caaatgaaat 39840  
 gcatggagga ggtggcatca gcagcagcat ctaaattggc aagagcagcc ttagatctga 39900  
 ggacttgagg ccccgaggct tcaactgaca gtaaagtaca caagagacca ggccacataa 39960  
 gctgcagccc tgccctcttc tgctaaatgc cttcaccttc attgccattt ccatacctag 40020  
 ggaagagccc tgggggttat catgttctc tegtgtgtg ccttttctcc acattcattt 40080  
 cttcatccat ccaacaaaata gctttcttac ataaactgtg agggacaaaa gttgttgaga 40140  
 agacagtccc tggcatccag ggatttggtg tctgatgaaa gagatagaca tgtaaacat 40200  
 tgctgcaagg agataagagc cctgctacaa gcctgtgga ggtaccgtgg gaatgcggga 40260  
 ggggagggga ggggccgggc tctgctgtg ggggtgggaa agacgaaaca gcaacacaa 40320  
 tccagtcaca tctcggtg cccagaagcgg ctgcaggcgt gaagacagag gagggtgtaa 40380  
 atgtcacaca ggtgaggag ggggaacgga gctgtgtg tgcctatcat cgtggaacaa 40440  
 gctctcttat ggcttccct gtaactccac ctctactccc accacgccac catccctggt 40500  
 cctggctgtg agctgtattt agaaaggccc tgtatttcca ggctgtgggc agtcatttgg 40560  
 ggtcgttttg ggtttgtgtt cctagcagca ggatgtctgg atcacaaaag cagtgtatcc 40620  
 actaaaacct ctctggcctg catccatgga agatgtgttc actgctggcc atctgttga 40680  
 gtggggcact gaacaaaagg ctatgtataa agttattcct cccagaatta cctatgatag 40740  
 caaaaattgg aagcaatcaa aatgttcaaa aatagataaa tggaagactg gctcaataac 40800  
 ttagagtata ctgttatgat gtaacatcat gcaacctctc aagaactggg ctaataaatt 40860  
 ttgagtata taggaagt tagtaaaagc tagtataagc tccagtatgt taaatgtata 40920  
 ctccctctct ctatgtatat ttgtgggtat atatataatt gcatagaaaa aagacaggaa 40980  
 ggtgccaggc acggtggctc acacctataa tcccagaact ttgggaggcc aaggtgggca 41040  
 ggactcactt gaggtcagga ttcaagagca gcctggccaa catggtgaaa ccccatatct 41100  
 actaaaaata gaaaaattag ccagggtgtg ttggcactgc ctgtagtccc agcttctccg 41160  
 caggctgaga caggagaatt gcctgaaccc gggaggcaga ggtttcagtg agccgagatt 41220  
 gcaccactgc actccagcct ggggtgacaga gcaagactgt ctcaaaaaaa aaattaaaat 41280  
 aaataaataa gaaaaaaga taggaagaaa atacgccaaa atgtgaagtg tggttatgag 41340  
 caaatattaat ttgtttttac atttttatgt attttccaaa gatttgataa tgagtatgtt 41400  
 ttacttgtat aatgagtc aaacaaaatg gggatgggtg tcatttttgt gttttaaatg 41460  
 tggattgagc atctagagaa aagtgacaag gatgggtgaga tgtagacat tgtgtcatta 41520  
 gactatctga aggaggacac ggcagtttct ctttttaaaa aactccatta gttatgggtc 41580  
 aaaggaagtc ccatggctag tggagaagtc ttgttctggg tttattgagc acaaaactgt 41640  
 aaaccacaaa tgagtgtact atcacgtgga ttgtagctca atagaagagg tcattaatct 41700  
 cggcgtaac aaccctatgg ctgtgtccag aggcctgag ctccctgacc ctaggagagt 41760  
 cctgcagagg ttatgtagga gccatctcta agagtctcta agaggggccc tccaactcta 41820  
 gcacgttgtg attttttt aatacagatc cttgtctggc catcctgatc atgcaagcct 41880

tctcatttcc caccatctat caccattga tacaacactc tcatcagtta atatcagctt 41940  
 cccatcttta tatataaaca tgcagccatt gacggggtga cagcctatct gcaggr+atc 42000  
 caggaggaag tagacagtca ggaagagaaa gggagtaaaa gccagaagca agctgacttg 42060  
 tgagccctgc cttttcctcg ccattgttca gacaagccca ttcctgactc agaatagtgg 42120  
 aactagtcac tggcctctca aatcatcaac gcactctctat tgatcatctt gtgctgacgg 42180  
 ctcaatgggc agtgtgtggg caacagtaag gtgattaaga ggaggtgctg gcccacaagt 42240  
 aacttacaac caagagtaga aaacaagtgg cgggtgcag tggctcacgc cgtaatccca 42300  
 gctccttggg aggtcgaggc aggcagatta tctgaggtca ggagtctgag accagcctgg 42360  
 ccaacatggc gaaaccccggt ctctactaaa aatacaaaaa ttagctgagt gtggtggcag 42420  
 gtgctctaa tcccagctac tcaggaggct gaggtaggag aattgcttga acctgggagg 42480  
 tggaggttgc agtgagccaa gatctcacca ctgcactcca gcctgggcaa cagagcaaga 42540  
 ctctgtctca aaaaaaaaaa aaaaaaaaaa aaaaaaaagg agtagaaaac aagcatgtaa 42600  
 agagcagaac tggaggagac gggcaaaaata agagcaccag caatgttcaa ggcacacaa 42660  
 tgacatggcc ctaactgtgc taaagagtca gaaggtgcgg ggctccagtg gaaaacacag 42720  
 tggattcagg accagaaaaa caaaatggag aattagaagg gtattcctgg ctggagctgt 42780  
 agtatgctga aaggcgtggg gatggctggg tgcagtggct cacacctgta accctgggtc 42840  
 tttgagaggc caagatgaga ggatcacttg aggccaggaa tttgagacca gcctgggcca 42900  
 catagtgaga caccatccct acaaaaaaaaaa tttaaaaatt agctaggcgt acacctgtaa 42960  
 tcccagcact ttgggaagcc taggcaggca gatcacaagg tcaggagatc gagaccatcc 43020  
 tggctaacac tgtgaaacct cgtctctact aaaaatacaa aaaaaaatta gctggccatg 43080  
 gtggcgggca cctgtagtcc cagctactcg ggaggtcgag gcaggagaat ggctggaacc 43140  
 tgggaggcga agcttgagcag gagcccgactg cctccagcc tgggcgacaa 43200  
 agtgagactc cgtctcaaaa aaaattagct aggcgtgatg gtgtgcacct gtagtcccag 43260  
 ctacttagga ggctgaggca ggaggactgc ttgagcccag gaggtttgagg ctgcagtaag 43320  
 ccataatcat tctgttgac tccagcttgt gtgacagaac aggcactgt ctctaaaaat 43380  
 actaataaaa gaaattagct gagcatgggt gcgcatgctt gtagtcttag ctattcgga 43440  
 ggctgagggt ggagactcac ttgagcccag gaggtttgagg ctgtagcatg ctatgatcat 43500  
 aacactgcac tccagcctca gcaacagagt gagatcctgt cacaagaaaa aaaaaaggca 43560  
 cagtgagaac acacagcatc tgaatgtgga gtggcatgat gctgctagaa tgggaaggtg 43620  
 gtggagttta ccatgggaaa gggagttgga atgagaggtt ggagccaagt tagggagtgt 43680  
 gggcctgac ctagggtgtt tgagagtcag tgaagatttc tgagtgaag aggcattga 43740  
 cctgcagcag tggtaagaaa gatgaatgag agactggaga gacacaagtc tgggattcct 43800  
 gtaagaggct attggaagag acgctggagc tctgaaccag ggcactcctg taggagtggt 43860  
 gaataagatc acgggcttga gagacatcct agagacagag ttggctgaat ttactactga 43920  
 gaaggactgg aggcagtag gagggagagg aggagaaaaac ttgggtgttg ttgaagatac 43980  
 catggcccta ccttttgcag accaccatat tcatgcctca atgctgggaa ctccctggg 44040  
 ctccgttcc tgtgccccat agctctggct gcttggctctc tgagtttttc ttgtcttagt 44100  
 aactgagcta cttcacttct ggccttggca catgatcaca gtgttgaaact gttctctctc 44160  
 aaggaacact cttgtccctt ccagccagcc tgcaagctcc tcgatgaaag acccaggggtg 44220  
 catgttggtg cccagcaggt gtatacctgt caaagcacta aactgatttg tgtggcttga 44280  
 aggcgtttac tggtaacctg acctccttcc ctccctcccc tgcagagacc tcacctctga 44340  
 ggaccagatc gtactgctga agtcaagtgc cattgaggtc atcatgttgc gctccaatga 44400  
 gtccttcacc atggacgaca tgtcctggac ctgtggcaac caagactaca agtaccgcgt 44460  
 cagtacgtg accaaaaggt tgcctagact ccacctctg gggagtcttt ttcagctccc 44520  
 agattctggc tccacctgtc ctgggggttg gctccaatca gatacatggg agggagttag 44580  
 gcaccaacag ggagagaagg gcgaggggtca gacctatggg gttggaggtg ggtggggcgc 44640  
 tctcagctc tggccgcagt acctggccat tgtctctcac agccggacac agcctggagc 44700  
 tgattgagcc cctcatcaag ttccaggttg gactgaagaa gctgaacttg catgaggag 44760  
 agcatgtcct gctcatggcc atctgcatcg tctccccagg tatggggcca ggcagggagg 44820  
 agctcagga cctggggagc ggggagtatg aaggacaaaag acctgctgag ggccagctgg 44880  
 gcaacctgaa gggagacgta gcaaaaggag acacagataa ggaaatacct actttgctgg 44940  
 tttgcagagc cctgtgtgtg tgtggacgct gaggtgcccc tcaactgccct tagctctgcc 45000  
 ttgcagagtg tgcaggcgat tcgtaggggg gattctgagg aactagataa gcaggggttc 45060  
 tggggccaca gacaggcctg cgcattccca atactcaggc tctgctcttg cgtgaactgg 45120  
 gctcaacatt cctgttattt gaggtttctt gcgggcaggg taaaaaactt tggagcctga 45180  
 gagatggttc tgcctatata gtttacctga ttgatttttg aggcaatgtg cagtgaacct 45240  
 tgacctcttc cgctgggttag aggtgagaag agggagaaaa ggccgaagag gaagttattg 45300

tgaccttggg	gacatgatgt	cggtgatgag	gtccaaagag	gggcgccct	gcctcagcct	45360
gtgctagtgg	cctgtgcccc	gggatgcttt	cctggactgg	aggctcaagg	aatggagatg	45420
ggctcctcta	cccctgcccc	gccagccttc	tctcattcat	tcatccactt	agcaacaatt	45480
tattgagcac	ctattaggtg	ccaggcacta	tgctaggtac	tgggggttcag	cagcaaatgg	45540
gacacaggct	cctctcccat	gaagcttagg	aggaacatt	aaacaaatgt	tatttaatta	45600
ttaattccta	acaaggcaag	agttttaaaa	ataaagtaag	tgatgtctaca	gaagggtaga	45660
atagaaggag	ggaagctgac	gtggtctggg	ctacagaggt	agagtgttgc	caggaatggc	45720
cttttgagg	aagacctttt	aagctgttat	ccaaaggatc	agtaagagtc	tggcaaagat	45780
agcagagcag	agttccaagc	agagggagca	cagatgtgaa	ggctgggtggc	cagagagcat	45840
ggcgcatcgg	gacgctgagg	gatggacaga	gcattggacag	ggagcaaggc	caggcaggga	45900
cagggccagg	tgcgcccattg	gaaggaccta	ggctctggatc	ctaaatgcac	ggagaagtca	45960
ctggagggtc	tgggggccag	gcagtgggtat	caccggtcag	cagtcataga	gggggtggcct	46020
aggggtgtct	gctgttgagt	gtctgtgtgg	gtgggggggtg	gtgggattga	gcagtggagg	46080
gcccagctga	gagctcctgt	gccttcttct	ctatccccgt	gcccacagat	cgctcctggg	46140
tgcaggacgc	cgcgctgatt	gaggccatcc	aggaccgcct	gtccaacaca	ctgcagacgt	46200
acatccgctg	ccgccacccg	ccccggggca	gccacctgct	ctatgccaaag	atgatccaga	46260
agctagccga	cctgcgcgagc	ctcaatgagg	agcaactcaa	gcagtaccgc	tgcctctcct	46320
tccagcctga	gtgcagcatg	aagetaacgc	cccttgtgct	cgaagtgttt	ggcaatgaga	46380
tctcctgact	aggacagcct	gtggcggtgc	ctgggtgggg	ctgctcctcc	agggccacgt	46440
gccaggcccg	gggtggcg	ctactcagca	gccctcctca	ccccgtctgg	ggttcagccc	46500
ctcctctgcc	acctccccta	tccaccacgc	ccattctctc	tctgtccaa	cctaaccctt	46560
ttcctgctgg	cttttccccg	gtcccttgag	acctcagcca	tgaggagtgt	ctgtttgttt	46620
gacaaagaaa	cccaagtggg	ggcagagggc	agaggctgga	ggcagggcct	tgcccagaga	46680
tgctccacc	gctgcctaag	tggtgtctga	ctgatgttga	gggaacagac	aggagaaatg	46740
catccattcc	tcaggagacg	agacacctgc	acctcccccc	actgcaggcc	ccgcttgtcc	46800
agcgccatgt	gggtgtctcc	tctcctgctt	actcagcata	aataatcggc	ccacagctcc	46860
caccccaccc	ccttcagtgc	ccaccaacat	cccattgccc	tggttatatt	ctcacgggca	46920
gtagctgtgg	tgagggtgggt	tttcttccca	tcaactggagc	accaggcacg	aacccacctg	46980
ctgagagacc	caaggaggaa	aaacagacaa	aaacagcctc	acagaagaat	atgacagctg	47040
tcctgtcac	caagctcaca	gttctctgcc	ctgggtctaa	ggggttggtt	gaggtggaag	47100
ccctccttcc	acggatccat	gtagcaggac	tgaattgttc	ccagtttgca	gaaaagcacc	47160
tgccgacctc	gtcctcccc	tgccagtgc	ttacctctctg	cccaggagag	ccagccctcc	47220
ctgtcctcct	cggatcacccg	agagttagccg	agagcctgct	ccccacccc	ctcccagggt	47280
gagaggggtc	ggagaagcag	tgagccgcat	cttctccatc	tggcagggtg	ggatggagga	47340
gaagaatttt	cagacccag	cggctgagtc	atgatctccc	tgccgcctca	atgtggttgc	47400
aaggccgctg	ttcacccaca	gggctaagag	ctagcgctgc	cgaccccccag	agtgtgggaa	47460
gggagagcgg	ggcagctctcg	ggtggctagt	cagagagagt	gtttgggggt	tccgtgatgt	47520
agggtaaagt	gccttcttat	tctactcca	ccaccacaaa	gtcaaaaggt	gcctgtgagg	47580
cagggggcga	gtgatacaac	ttcaagtgc	tgctctctgc	agccagccca	gcccagctgg	47640
tgggaagcgt	ctgtccggtt	actccaaggt	ggggtctttg	tgagagtga	ctgtagggtg	47700
gcgggaccgg	tacagaaagg	cgcttcttgc	ggtggatcac	agaggcttct	tcagatcagt	47760
gcttgagttt	ggggaatgcg	gccgcattcc	ctgagtcacc	aggaatgtta	aagtcagtgg	47820
gaacgtgact	gccccaaactc	ctggaagctg	tgctcttgca	cctgcatccg	tagttccctg	47880
aaaaccagga	gaggaatcag	acttcacact	gcaagagcct	tggtgtccac	ctggccccat	47940
gtctctcaga	attcttcagg	tggaaaaaca	ctgaaaagcc	acgttcctta	ctgcagaata	48000
gcataatat	cgcttaattct	ttaatttatt	agatatgagt	tgttttcaga	ctcagactcc	48060
atltgtatta	tagtctaata	tacagggtag	caggtaccac	tgatttggtg	atatttatgg	48120
ggggagaaact	tacattgtga	aacttctgta	cattaattat	tattgctgtt	gttattttac	48180
aagggtctag	ggagagaccc	ttgtttgatt	ttagctgcag	aacgtattgg	tccagcttgc	48240
tcttcagtgg	gagaaaaacac	ttgtaagttg	ctaaacgagt	caatcccctc	attcaggaaa	48300
actgacagag	gagggcgtga	ctcacccaag	catatataac	tagctagaag	tggggccagga	48360
caggccccgg	gcgggtggctc	acgcctgtaa	tcccagcagt	ttgggaggtc	gaggtaggtg	48420
gatcacctga	ggtcgggagt	tcgagaccaa	cctgaccaac	atggagaaac	cctgtctcta	48480
ttaaaaatac	aaaaaaaaaaa	aaaaaaaaaaa	tagccgggca	tgggtggcgca	agcctgtaat	48540
cccagctact	caggaggctg	aggcagaaga	attgaacca	ggaggtggag	gttgagctga	48600
gctgagatcg	tgcggttact	ctccaacctg	gacaacaaga	gcgaaactcc	gtcttagaag	48660
tggaccagga	caggaccaga	ttttggagtc	atggtccggt	gtccttttca	ctacaccatg	48720

```

tttgagctca gacccccact ctcattcccc aggtggetga cccagtcctt gggggaagcc 48780
ctggatttca gaaagagcaa gtctggatct gggacccttt ccttccttcc ctggcttgta 48840
actccaccaa cccatcagaa ggagaaggaa ggagactcac ctctgcctca atgtgaatca 48900
gaccctaccc caccacgatg tggccctggc ctgctgggct ctcacacctca gccttgata 48960
atgctgttgc ctcactata acatgcattt gtctttgtaa tgtcaccacc tccccagctc 49020
tccctctggc cctgccttct tccgggaact cctggaaata tcagttactc agccctgggc 49080
cccaccactt agggcactcc tccaaaaggaa gtctaggagc tgggaggaaa agaaaagagg 49140
ggaaaatag tttttatggg gctgaacggg gagaaaaggt catcatcgat tctactttag 49200
aatgagagtg tgaaatagac atttgtaaatt gtaaaacttt taaggatatatt cattataact 49260
gaaggagaag gtgccccaaa atgcaagatt tccacaaga tccccagaga caggaaaatc 49320
ctctggctgg ctaactggaa gcatgtagga gaatccaagc gaggtcaaca gagaaggcag 49380
gaatgtgtgg cagatttagt gaaagctaga gatatggcag cgaaggatg taaacagtgc 49440
ctgctgaatg atttccaaag agaaaaaaag tttgccagaa gtttgtcaag tcaaccaatg 49500
tagaaagctt tgcttatggg aataaaaaatg gctcatactt atatagcact tactttgttg 49560
caagtactgc tgtaataaaa tgctttatgc aaaccaattt gccttatcct tataaggacc 49620
ttatgggaga tgaatcatta ttacccccat ttgacagaaa ggatagcttg agcaatgcc 49680
cactagcaag ggatgggatt tgaaccttca gcagctaggc tcagaagcca caaatatt 49740
gctacattgt cctgcttccct attgagttgg gggacctgac agacgactga tggctctgct 49800
agctctctcc tagagaggag ataaaagagg tccccattcc taaagcaggc cctgagccag 49860
gaaaattaga ggtgctggac caaactgtgc tctactccca ggaagtgtgc agtcaatata 49920
tgacacctac gtgagacctt caaaaatgaa aaccaaacag ctactggcaa aactgtgtct 49980
gccattagag atggcgggctg 50000

50001 tgccagtgc ctggaggatt acaaatgact gctgtgcaga
50041 aacaggactc ctaaggggccc caacttatgc cgtatgcact cattctgctt cccaaggaag
50101 tgggggtttat gatgaagggg agcatttgcta ggcacagtaa acaagaacac agcattgtga
50161 tctgaaaata aggaaatcat gccagctaat gtattgattg aggataagtt ggctgggga
50221 tgtgattcac tctaattttt cagaaacatc tgaaaatatt tcaaaccaaa ggctaaaatg
50281 tgtttcagtg ggatgagatg gacttagggg aattgggggtt agaacttgag ggttattttg
50341 tgaaaacatga agggacttag agaaaggaaa tcaacagctg cataaatggg catgtctctg
50401 gctggagaaa tgtggagaat ggagtctga tacactgtta gaaggatctt atgtagcatt
50461 tttatagctg acctagaaga acacaaaatt tccaaaggctg tgttataatg cgcttttcca
50521 ggtaaaccaa gaggaatata ccccaggaag gttgcataat taggatcaag tgttttcaag
50581 ttttcatatt ccaagctttg gttctatgcc tacactgttc aatccagtag ccactagcta
50641 catgtgagta tttaaatgaa ataaaggtaa acatctagct tgtcaaccgc acaagccaca
50701 gttccagtat ttgataacct cagggtacc gtaagagaca gtgcaaatc acaacatttt
50761 cttccttttt tctttcttct tctttctttt tttctttctt ttttcttctt tttttttttt
50821 gagacagagt cttgctctgt caccaggct ggagtgcagt ggcacaatct cggtcactg
50881 caacctctgc ctcaggctt caaacattc tccctgctca gectcatgag tagctgggat
50941 tacaggcacc tgacaccatg cctggctaag ttttgtattt ttagtagaga cagggttcca
51001 ccattgtgtc caggctggct ttgaactcct gacctcaagt tatctgccc cctcagctc
51061 ccaaagtgtc gggattacaa gcgtgacatt ttcacatcg cagaatagtc tatggggcag
51121 cactggctca cacaatgcat tcttatctgg tactaattgt gaatgactcc atgaggatgc
51181 tggcgtcatg tgcttctgtt gatctgtagg gcagaatggc cactaacttg acatcatatg
51241 gaagtgtctat agggaaacat ctcctcttac aatgggctat gccacacctg gggtagttcg
51301 aatgagtctg cttcttaaaa gagacataaa gcaaaaacac tgcacagacc atgggggtga
51361 taggctcaaa gcatcatgtg gtataaatag ctcactggtg tgctaggagt attgattcct
51421 ttagccctgg agcaagcaaa cagggcctgc caggagtgc cacagccctt caatttcccc
51481 agcttctacc aggtccttg caggctgcct gtgcagtgc ggtcggctc cctgccccat
51541 ggtccctgca gatgacaaga aggatggatg ctgtctgaca cctccagcat ggccaaggag
51601 atggctcatc atgctgacat cctataggca actagtctc attgtgggca gggagcccg
51661 gaggtgatg gggagtctgt gctcctcaag acccagaagc acagcagggt gtggagcctg
51721 tggctggcag ggggaatctg agagctcgct gctccagaca gctgctccga atctctgtat
51781 gcacgcatgt gatatatgat atacgggatg gtgttgcaag ttgggttcca gggacgtaga
51841 ctctgaaatg caggttgaag tgcaggggagc ttgttaggga gcagtctcag gattatcagc
51901 cctggtggaa gggaaagaag tagaattagc agtgggagaa gttgggctgc aaagcagtct
51961 cagtgaaggt ctcaatcaac cegtgtgggg atctctgaag ctgggatggc cctttggatt
52021 gceccaagat gaagtgaggg agacacttct atattcctgc atcaggtagt cattggacgc

```

52081 aggcctgttcc ctgaagagca tgtgatttca ttgacatgac ctcagctagg cggctctttt  
 52141 cagcctgtgg cccataggac atgtccataa ggggtgtttt cttcacattc tatacaacct  
 52201 ggtgagcact tctggagtga gctgctctgg cttggggaga cgctggaaga gttccaggcc  
 52261 ctctcctgtg gctctatcca aggagagtgc tgactccaaa ggagggggtt cccagcctcc  
 52321 cctcagttat ggattagctg gggtattttt cctaaatcat cttgagtttc accacgaggt  
 52381 ggtgctactg ccctacaggg atagctttga gccacttgcc tggccccccg ccccaaaagc  
 52441 cccaatcaca tcccccttcc accctttctc tatctccatg atatgagtga gattcagcaa  
 52501 ggctctgagt ctctgctact gaggggcatct ggtgggtgctt acctctcttc atgccagcga  
 52561 catgggggtta gggatctgct ctctggcttc tctcccagg caacagggag tatctgacct  
 52621 tctcacacct cacccaaggg cctcccaggg tcttggtgcc cgggcctctg agcatagtcc  
 52681 gtgctgacag tgagcggagg tgcaggttcc ctctgaggtc cagccaagtt atgtagtctt  
 52741 tccagtgttt ctaaccagcc acaccaccga gctcagtgct ggggatattg cgatgaacaa  
 52801 gacagtcgcc acccccaaga aaagcactgt gcagtgggag aagacagccc tacagacaga  
 52861 tgagtactag gcatgccaa ggaagctgc aaagtgttaa caagttaaaa gtaacagtta  
 52921 acaagtaaac tgctgtctcc caggcctggc tctgccattt gctatttcta tgacctggg  
 52981 caagttactt aatgtttttg agcctcagtt tcttcacaga atggtaacaa taatagtacc  
 53041 tacctcatag atttgctgtt gttgtgatat aatctgtgta aagcatttat aacagtacct  
 53101 ggcacgtagt tatcaatcat gtgttgccca acatcactat tgggttgctg agatggccaa  
 53161 ataagttttt atcaaggagg tgacattgct cccacatttc gacctccgat ccttgatggg  
 53221 cctcttagat tcaactccagg ctgatttttt ggggcgcctc ttccggatct cagcttcttg  
 53281 gtgctaggga ctctgctcc atgatatcta ccagaactga gagaaggtgt cattgtacca  
 53341 cctggccacc agggggcagg tgtgccactt aataaaccaa attggcccca gccgaaagct  
 53401 gcctggggag aaaagtgtgg gaaagaggtg ggaagatagg aatataaatc tgaaatgcat  
 53461 ggaactctag tgactactgt ccccaacttc tctcagtcac gttctttatt tgtcaatgtc  
 53521 aatccttcaa caatcaccaa cacctggact tcaactacat cgtatttact gacctataat  
 53581 taatgtcagt attctctggc aaggggtggc ttatgccag agaaaaggga atcaagacaa  
 53641 gtttcaagaa tcgggtttga tcgattcatt tatcccatg tttgttggaa cctgcttct  
 53701 ctgatgaggt ataaacccca ccatgatctc ttcagtgtca tttgtctttg ttccagacat  
 53761 tgaaacttaa ccgaccaccg tgtctgggta cgtgcagttc tctgaacgtg cagctctgtg  
 53821 gcttgctctt aaaccagagt ttctcaagca tttgggtcct ggcacctctt tactctctta  
 53881 aaaagaagga ccccaagaa cttttgtgtg tgtgggttag attcatcaat atgtaccatt  
 53941 agaaatttaa acagacattt ttaaaagtga ttctttaaat gtggcaataa tgaatctatt  
 54001 aaaagttaga acaaataaca ctttttttcc tttaaaataa ccagtttcca aagtaaaact  
 54061 aatttaataa caagacagta ttgtttcaca gttttgcaa tctctttaat gtctggttta  
 54121 gtagaaggca gccagattct catattggct tctgcattca acctgttatg atatcatgtg  
 54181 tcaagaagcc tccggaaaac tccactgtac acttgtgaga aaatgagagt caaaaaggct  
 54241 aataatgtcc ctgctagaaa atgaaatgca aacagactta catgtggctt cagaaacttc atactaactc  
 54301 tttcaacttc agaacctgtg aagtttaatt acatccccct cattctgtac ttggctaatt cgtgtgtgtg  
 54361 ctctccctaa agtgtctgcc acatccccct cattctgtac ttggctaatt cgtgtgtgtg  
 54421 tgtgtgtgtg tgtgtgtgtg tgtgtgtgtg tatgtgtgaa agagaaggac agaaagagag  
 54481 agagatggtc tctctgtggc ctaggccgga gtgcatgatc atagctcact gcagactcaa  
 54541 actcctgggc tcaagcaatc ctctcatctc agcctcctga gcagctggga ccaccggcac  
 54601 actcagctaa tttttttgtg ttttgtaaag acgaggtctc tctatgttgc ctaggctagt  
 54661 cctgaactcc tgacttgaag caaacccccct ccttctctcc caagccttg cctctcaaag  
 54721 tgctgggggt acaggtgtga gccaccgtgc ctggccacca atttgttttt gactaaatgc  
 54781 agaattgtgc atttgtccct ctttatattt atctgatttt attatccac actggcctgc  
 54841 tcgaatgttt tgaatcctca ttttgtcacc cagtattctc accatccctc ctgctcttgc  
 54901 atcttccaaa agctaggtct gcagaccata ttcagagttg actgagacag agccaaagac  
 54961 tgtgtctctc tgcaggttaa cattagctca tgaaccagaa gctctttggt tcagtgttct  
 55021 aagacctcac cgataaggaa gggaagcggg tgggtaatga gagactgagc ctcaggtgag  
 55081 gggagtcatt ggaaagactc aggtaccaca ggaatgcggg gaacttgtca atgctgccac  
 55141 agccccctcc tctcaggac tcaacagcct cactccaagt ctgaacagac tctttaagaa  
 55201 ttgacagat ctgagccaag ggtcacagat ccagggttat ttgatctagg ggatgcacaa  
 55261 ggggtggatc aagtatcaaa tttcaagctg ggtgttctg caaattgtct gagctggact  
 55321 ctgggaagga aggcattggc tcttagatac tgggtgctga gaggaggaag gcaggaagaa  
 55381 gctccctgta gctcctgggg gtagtgggca gagctccccct tagacctcca gacctgtg  
 55441 gtgaaaggag aagtcacaca tagcctggtc gacagccctt atttagctcc gtagggcctc

55501 cccgctgcac tcttcacttg cactcagaag cctactgggc ctctggaaag gcccattgcca  
 55561 cccctgaccca atcccaaate ctggctggac atgggtggctc atgcctgtaa tcccaacact  
 55621 ttgggaggcc ggggaggag gattacttga ggccaggatt tcaagaccag cctgggcaac  
 55681 atagagaggc ggcattctcta caaacaatt ttaaaaataa attagctggg cctgggtggca  
 55741 tgtgcctgta gtccatagcta cctggggggc caaggtggga ggactgcctg agctccggag  
 55801 gttgagctct caatgagcca tgatgcacc actgcactct agcctgggca atagagcgag  
 55861 agcctatgtc aaaaaacaac aaaaacaaaa gaatcctgca gacacctgtg aacatctgtg  
 55921 gcagccggca tggggctagg gccaaagtga gggcaggtgc cccaactttg tcaactcctg  
 55981 actactatct ccccatcttg ctactaggct ggccagatag atcaagcggc ctatcaggaa  
 56041 gggtctggtc ccctaagcca ctggcccagc ctggcaagga ctgtgagccc cagggttaagc  
 56101 gtgtagggga aatgtcctg gtatcctttc tgettectcc acttccccta gcccactga  
 56161 tttacatgtc tttccctctc ctaccagga gcccgcggag agggacaggg aggggattgt  
 56221 ggaggccctg ggtgataaag tagggatggg ggagaagtga taaagggggt gggggagag  
 56281 ccagctgcac ttccctccctg atagggaccc caccacaaga ggctcctgcc tctgtgtgt  
 56341 tcacaggaag gactggagggt ggtagaggga tggatgggga gggcggtggg caggatatca  
 56401 gtggcttctg caatcctttg ccttgggaaga tgacagttca ttattttgtc cttcggttgt  
 56461 tcattcatca gcaataactt accacactcc tcctaccacc gctggcagag ctctgggctg  
 56521 ggagggccaa ggaggcagat tgagctcagt agctctgctg gtctcccctc caccaccctc  
 56581 ttcagccttg agggaggcaa tgagtgaata agagatgaac tttaacagca ggtcattgga  
 56641 atcctgatag tgtctcttac tgactgtgta accttgtggg aaatgtgtga gctctctgat  
 56701 ctccagcttt ctcatctgtg aatgaccatg tagagctggg aaagataacg gaaggaaggc  
 56761 tcgcagcacg ccgcagggcc tggccttgtc tagggcagca atgaagagca gcagaagtgg  
 56821 catctagcag gacgaggatt tgaaccctgg cagtcctctg agtcgctgtg gaactgctgg  
 56881 ctattttgtc gtcttctgta aagcaaagag agtaatggta cttacttctt aggtgtgtg  
 56941 aagaccacat gagctactat gtagtattta gaattgcgct tggcatggag ttcggtgtc  
 57001 ggtaaatggt agcctttatt actgtaattt tcatcatcct ctggggaccc tctcctctaa  
 57061 agagataacg tctaacttga tatcgtcttc cttataagca gtcctccaa cacattccaa  
 57121 gtcagggata gacggggtag aagcagggtg tcacaggtgg acccctcttg tgaaggcca  
 57181 agctggccct caaccagct cctaggatgg cagacgcacg cctggcccgg cccatggtgc  
 57241 caacaactcc gcttactccc ccagctccac ggtgtgtgtc tgggtggtag tgcggaagac  
 57301 ctgaggctctg ccccatctc tcctcctgca aagcctcctc caccggttaa ccccaaccg  
 57361 agattataga gcctcaactg tctccaactg ctctgattca gggataaggc tggacctctg  
 57421 agcccatcag cccacagtg ttgaggggag gctgcctggt tcctgggag ctggcgagct  
 57481 ggggaagtgt gaccacggca gaggtggggg acacccccct gccacactgc ctgctgtctc  
 57541 tgggtgtgccc tccagaactt gaggaaaaaa gtgactctcc tctggggaga ggccttctg  
 57601 ggttcaacta ggctcttttc tccatctctc gtcttctctg tctacctcgc tggctccagg  
 57661 ctgctctctac tgtttctact tctctctcag gctgctcttc cccaccccc agagcctcga  
 57721 agctgcacac ctgtctctc acatcagata acccgaccac agcagctctc gtcacccag  
 57781 ccaggctccc agcagcccc cagctccctc gcccatcgcc ctcttctct cctgccacc  
 57841 ccacttctta gctccctgac acactacac agcctgggg agggactggg aggggaaccc  
 57901 caaagcctta ctgggtaatg aggtgtgtg aagacagctc ttcctactcc ccaacataca  
 57961 cgcgtgcgcg cgcacgcgcg cgcgcgcaca cacacacaca cacacacggt cacacacggt  
 58021 ggaactctta taccctgtg cctagtcaga aacagtgcag gggagggacc cagggaccag  
 58081 gcctcgagggt atgaggaaaa tccatctctg ccaagtgcag ggggtgggga gtcacagaaa  
 58141 ggggcagctt ctggggctga gggttccact gcctcctgtt tttaggcaaa gagtttccag  
 58201 ggcttcatct ccaagtctta aggttagagg cccccagcag ggcctcctc tgggtggagct  
 58261 gggctgggga ggtgggtggg tgccatgtgg acctgcccc gccccttccc actgttctc  
 58321 aagaggccaa gtggggagga ggttgggggg tgggtgtggg ggcagcgcg ctgagtttg  
 58381 gatgctgggg ctgagggaga ctgggtaaga gctgggcagg acaccgtggg aaggggagtg  
 58441 gtgggacctta ggaggaggga gaacaaagac caggggtgct gggagctgga ggttttaata  
 58501 cctcttgaca acaaatgaat cataggcaaa ttctgtggaa atgatggcgt aaagaaagat  
 58561 gtgttatttc aaggccccag tgtgtgtgtg tgggaagaga gtggaacggg gaggagcagg  
 58621 aggcctaagtg gcgcctgtag gtggggggcc gggtagagtt cctgggggag cctgtaaggt  
 58681 gatggccctt gcattctcat tcaccttcag ggggtgatgt gaaacagcag gtggccgacc  
 58741 acagcccgcc aacccccacc ccaaagcaga gaggcctca taccgctga gtcacctca  
 58801 ctgtgatgct ctgttctctc tgcagtcagc cctgtcctct gggggctgtc cccacaggcg  
 58861 cctgcccattg cctgtctctc agcagtagta gaggagacta tggagctcca ggagcctccc

58921 atatatggga gggaatctgc agtgagcacc tggccatcac cctcacggt gggctttttc  
 58981 ctatcaggag aatgctgagt tgataccac agtgaccgca cctgccttgc ggtcggagct  
 59041 cagtctatta agttgccaga taaatgcatt tgtggcctct ggaaggttgt cagggccctt  
 59101 gctatagctg agacccaaat ctcagcttct ggtcaaccct cattcccgt ctcgcgaatg  
 59161 ttaagactca ttaaatgaga ccaaaacat atatacccat tccaccctac ataataccta  
 59221 cctatgacac atatttcttc ttcaccttct cctccatgcc tatatgtttt ttaatacagt  
 59281 tgcaatcatg gggatgttac caatctctat tctcttgtga tgctgtgttg catataaaca  
 59341 tcttcctaac agcttcatag ttttctatta agtggaata tagtatcata atttacctcc  
 59401 acaattttcc aatcataagt gttcaaattg tctctaattt tctatattat aggcagtgtg  
 59461 atggggggaca tcattaggca cactactcgc tctctctccc ccaattttga ctatagaaat  
 59521 ctagtttagg atacactggg tggggttatt gagccaaagg gtaacagcac attatagctc  
 59581 ttactatata ttgccaaact gatttcaaaa gaggttacgc cattaccgac agcacacaca  
 59641 cttcacagag ctctcgctaa tgtttcaaaa aggacacct ctttgtctca ttttaattgg  
 59701 cattactttg aggacgatca ggttgaaact acccctacct ctgcttgtga gttgtgttcc  
 59761 ctctgtacca ggagagtctg tttctgggct ttgaacttta gtctccactg ttctagtgtc  
 59821 tcttaacagt ttgtgtgagc tctctttata agaattgatt tagggccggg tgcgggtggc  
 59881 catacctgta atcccagcac tttgggaggc cgaggcaggc agattgctg aggtcagacc  
 59941 agcctggcca acatgggtgaa accctgtctc tactaaaaat atagaaatta gccgggcttg  
 60001 gtggcggtg cctgtagtcc cagctactcg ggaggctgag gcaggagaat cacttgaacc  
 60061 tgggagtcgg aggttgagc gagccctgat catgccattg cactccagcc tggggccacag  
 60121 agcaagactt catctcaaac aaaaacaaac aacaacaaaa aaatgatttt aaagcattgt  
 60181 caactgcaac cgtgtgcgag tctctctctc ttgatattct ctcccacttg ggattccgat  
 60241 gcacttcttc ttgcttcatt gaaatctgtg actgctcccg gectgtctca gcttccactc  
 60301 ctgcgccatc tgaagtcttt gttttctcag gtttctgtat ttagccatct tccctgccct  
 60361 ccccttctct cctctcttct cccctgtctc tgtgggtgtca ttcattctca caatttctc  
 60421 tctcactgat gacctccaaa ttcttctctg agctccagat accaactgtc cactcaacaa  
 60481 ccccccctgc tcatccacc aacacctcaa actccacctg tgcaaagctc cattctgcat  
 60541 tttctctcaa atttgcttct cctcccatat tcttaactc agctactcaa atacctttgg  
 60601 gtttgagatc gcttttgaa gaggaagag gaaggtggag gctaattgag ctgaagaggt  
 60661 aatcggtatc tatcaacctt ctgctcagag aaggagcact gggaaggcca ggagaaggcc  
 60721 agttgtcagg gaagatgctg ctctatgctt caatttctt gcttgccttg acactaaaac  
 60781 ggatccaggt ctatagatag atgcttgaaa cccaaaggga gtgggtcacc tcttagagca  
 60841 aattaaccct taacactggc ctcaccagct ttttcttca cctcttgagc ctcttcccca  
 60901 ataagagact ggaagggatg aagaagaggt aaagctataa gtctaaactt gtgctgtcca  
 60961 tacagtagcc agtgggccaca tgtggctact aagcacttga aatgtggcca gtcagaattg  
 61021 aaatgtgctg ttagtataaa atatacactg gctttcaaac acttagtatg gaaaaaaaat  
 61081 gtaaaagatt tcattagtaa ttttttattt tgattgcata ccaaaaataat gttttagatt  
 61141 tactatatta ggttacataa atatactact aaaaatgaatt tcacctgttt atttttctt  
 61201 tttttgatgt ggctaataga aaataagtta catatgtggc tcacattccg tttctatttg  
 61261 acagcgctta tctagacctt cccagcaggt gaagtgtggg gctccaggct cgggagacaa  
 61321 gggcagtaga tgacagacac aggtgcaggg cctactacag gtgtgggcca gccagagctc  
 61381 caaccagatg tctccagaca gacactgaag gacagattct cagtggccag cctcactcag  
 61441 gcgaagcaaa gccaggcaac atttcttgga taattccttc agtctttgac ttcattgagg  
 61501 tctctggact gaggtcttag tctcttgagc ttgtccctgt agatgcccc ttattctgga  
 61561 aaaacactca cccaggacca cccagacctt tggatcccc cacttgata gttcattgga  
 61621 agatttttct atcactccac ctggggcagg tcttgatctt ctttccagaa gccagaggt  
 61681 gtccttcttc ctgtctagag cctctctctc cactgactct gtcttaggct tagctacca  
 61741 caggctggga ggggatgaga gatggaggtg tgetcaactt gacctgaac ttcattgtac  
 61801 actacctggg tcacaggcac attttgagct ccatttctaa tgcctataga agggaacagg  
 61861 aggggacgag ggggtggcaga tatactccat tgggctgccc tctctgtctt cattctctt  
 61921 ttctgtgccc cgggtgccc catttgagg cactgaagct ggggcccagt ctgctgggt  
 61981 ctgccccctc ctctcttgc ctatagact ccacctctcc caggctctgg ctgggacccg  
 62041 aaggccccag gcaagtgggg gaaggggagc cactccact tccccagaag ctgctgtgc  
 62101 ctcttctgt tttgctaaaa ctctggctct ggactcaagc aaagaggggg aagtcaccag  
 62161 ctctgcccc cggccccaaa aggtcaacct tggccccctg gtcctcttat ttatagcccc  
 62221 cactaccac cccccccca cccccggc ccaggccctg gctaaggagc tggatgtctc  
 62281 ctccctcaaa tagcagctgt ggccattgcc ccagggatac agccagatgg gcagatcact



62341 ccagatgtgc agtgtttcgg gaggggagggc caggcccttt ctgcagtccc tgtgggtactc  
 62401 cccgcagcct ggtcctgggt cccctcaact tcaagacaac acttgaggat ttcaggagga  
 62461 tcaggaaggt tgcacctatt ttcccatctt tgtagcctgg ccaagctacc ctgtataccc  
 62521 tagaaaaggtc agcttgggcg ataggcccta ctggattcat ttgcataaat cagctcagt  
 62581 ctcaactttga gacctcaaat tatagaggaa aacaggctta gggagacaga agagacagga  
 62641 cactgtctct cttctattac tgatgtgagc attggagctc tgtccctaac agcccaatgt  
 62701 gtgccaggca ctgtagttaa gtacttcacg tcccaatctc atcggctctc gcaaaaccct  
 62761 aatatagcag gcacttcata ccctaactct cagatgggaa accaagactc ctcaagggtta  
 62821 aataatatac gtaagggtcaa gcagtgggga agcaacaagc tccagcccaa gcagctcgac  
 62881 accaaatcct tgcctctaac cacagtacaa cactcctca ctctgtccat tcttctgggt  
 62941 acttttaaat gatctctttt tttctttctt tcgttttgag gtggagtctc actctgtcac  
 63001 ccgggctgga atgcagtagc acgatctcag ctcaactgaa actctgcctt ctggattcaa  
 63061 gcaattctcc tgcctcagcc tccggagtag ctgagattac aggtgcctgc caccacgct  
 63121 ggctaatttt tgtgttttta gtagagcgg gggtttgcca tgttgccgg gctggctctg  
 63181 aactcctgac ctgaggtaat ctgccactt cagcctccca aaatgctggg tttacagggtg  
 63241 tgagccacca cgcaggccta aatgatctct taaaagctca gtgcaggggg ccaggcatgg  
 63301 tggctcacac ctgtaatccc agcactttgg gaggccgaga cagggtggatc acctgaggtc  
 63361 aggacttcaa gaccagcctg gctaacatgg tgaaccctg tttctactaa aaatacaaaa  
 63421 aaattagcca ggtgtggtgg tgtgtgctg taatcccagc tactcgggag gctgaggcag  
 63481 gagaatcgct tgaaccggga aggcagtagt tgcagtgagc cgagattgca tcattgact  
 63541 ccagcttggg caacaagagc caaactctgt ctaaaaaaa aaaaaaatgc tcagtgcagg  
 63601 gaaccctgga gccaggact caggccctgc ccaagggaga tgtctgcaca ttgtctctgc  
 63661 ctcccttgcc ttcccacccc tagccattta gaccaagctg gagtgaggga tctgttgagg  
 63721 cagagatttc tagaatcact gttctgggtt tctcagacc ccaagcaca aggagagcag  
 63781 gtgagggcag aactattgcc ccaaccaca ttgatccag gatccattag gtgtctcca  
 63841 gcttggaaact ctggtgactc tgaatcctcc ctctccttg cagcatatgt tattcgagtc  
 63901 cctcatccaa ccgttttctc cactccaggt tctgttctta gattgtatcc tgcctcccag  
 63961 gaggtgatga attcctcact gtggcttttt tttttttttt tgcctctgtg cctgagagtc  
 64021 tgacacgggt cctggcaaag agtagatgct caacaaatgt gtgttgatga agaggagtat  
 64081 aatggtgata atcatgggtg gagtttttca aggtctcagc cagggcaccc tcgctcacct  
 64141 cccagcttag ccaccctcag ctcatgtctc tctttcctgc ctctagtctc ctgactcaca  
 64201 ggtgcataat ccaaactcac cctaaaagac actcctgggg aaagagaggt atgtgcttcc  
 64261 aggccaagac cttctcaggg gtctctcctg gagattctgg agtcagaggt agtgcttcc  
 64321 aaagaagaag cattgagatt tgtagtaaag tgggaacctg ttgaccagcc aatatagccc  
 64381 ctggggcaac tggaggggtg tgttggggca tatggcaagg ccgaagctga agcctgccag  
 64441 tgggaggacc acagcatccc tgcaggggccc cagtggagca agtaatgggt agctggctgc  
 64501 agaaaggcat tttgcaactc agacgaattt cttctcactc atgattagag tatggcccag  
 64561 tggctgcctc cctgaccata atctctgctg gcacaggcat ctctgggctg ggcagcccag  
 64621 gctgtggaag gagcgtgac ctggaaaccc tggggcttga gttctctgccc tgccttggcc  
 64681 ctgattaacc gtgtcatctc tggcaattta cgtcctcctc atgtcctccg tttctctatc  
 64741 tgtaaaagga atggttttga ttagaccagg gagtcccaaa cttaaccaca ccttagaatt  
 64801 acctgtggtg ctgcagggtc ctgggtacta tccaaccttc tcaaagagtc tgatggggtc  
 64861 ggggatggga ctcaggatc tttttttcac aggttctttc aagtggtttt tattactta  
 64921 tttatttttt gagtcagagt cttgtctgtg cggccaggct ggagtgcagt ggtgcactac  
 64981 aaccttgacc tctgggttcc aagcaattct cctgcctcag cctcctgggt aactgagatt  
 65041 accggcatgt gccaccacac ctggctaatt tttgtatttt tagtagagac ggggtttccc  
 65101 catgctggcc aggtgtgtct caaactcctg acctcagatg atccacctgc ctggcctcc  
 65161 caaagtgtct ggattacagg catgagccac tgcgccagc ctacgtggtt ttgataaagt  
 65221 gttaggttta ggggatccca gagactagat aatcttataa aacacttgca gcttttggga  
 65281 gcaaataattc tcgtaaatgg aatgggtaca tegttaggtt ttgtctgctga ggggttttat  
 65341 cagagagcag gtgatgggtg gtttatttta tcattatcat tatcattatt attattttgc  
 65401 tgetggcatt attgttatag aaggatgtgg cacctgccca tctgtgtgtt tctgccatga  
 65461 acaaggttct ggcctaagcg gggcctcgct tacctcaggg tgggagtgga agctgggaga  
 65521 ggagggtagg gaggggaagg ctttccctgg tgggtggggc ctcttggcaa ggggacctg  
 65581 ctttccctct ctccctgggt gagtttggct ccacaggctt tggcaccaaa ctctggggct  
 65641 gagagcgtct ctccccaccc atattcctcc ccaactttca catcttagcc actcagtcct  
 65701 ggggactgcc cccttctact cttcctttcc cgacttctc cccaggcccc tccaactcgt



65761 ccaacctcat tcttgagcct ggctaactctg tttgccaccc tctgttctct tgccctgcgc  
65821 ttgcacatgc cattctccct acctggaatg tcacccctc ttctctcccc actctgattc  
65881 acatctctgg gctctttcaa aaccagttt gaccgacact tgccagcttc atggaggccg  
65941 tgttctgtcc cgatgtgtc cggctctccc tctttgcgac gcaactattt gcgcttgaa  
66001 taatagaatc agaaaactgc tttagactca gaaaaataaa tatagatgat ctaaagcagc  
66061 cccctcattt gacagatgag aaaactgagg cccagggtgg ttgcgacttg gccaaatca  
66121 cacagtgaga ttttttaaat agttggcttt gcaagaggct ttcaagtatt ttatgtgttt  
66181 gttttgtttc ctcaacgctc tgtgaccaat agaaggcgag gtgctttgtt tttgttttg  
66241 tttttaatgt tcttatctcc acactcttgt tgtgttgtgt atccaggagc taaagtacgc  
66301 aattgtaata tttgttatgc catcaggaaa ataattctaa aactcacagt ggtacaaatc  
66361 ttttcatgta ttattcatct gatttcaggc cagccctgtg aggtaatgag ccaagatatt  
66421 gctatttaca aagcaggaaa ctgagactta gaaagggtgt acccagggaag ttaatggcag  
66481 agctgggcct aaaactcaag ttccctgact cccagcccag gctcctgac ccacaatgt  
66541 ctcttttcta gctctctcct gatgctctg gctggggacc tggcatagtc aagggggtga  
66601 ccgttgccgt cttttcattc atgggtacct tttgtcttg ggcttgagga gactgtctgg  
66661 ctctctgccc ctccccatcc tgtcccagtg ctttctcctt gtgtccctg ccacatagtt  
66721 ggcacataga cacatacatg tatattcaga actgcagggt tctagggcaa cagaccacag  
66781 gggaaaccac atcacctttg ttgactctgt agggagatgg gggttaaggg aagggaccag  
66841 cttagttctc tccacctgcc ccagtcacca cagtcactta cctcccaac ctgagacctt  
66901 ggtacttata gccacactgt agcctctctt tgatctagcc atccaattct ggcccagaag  
66961 gatttgccac ctcttctctc agatcctgac atcctagata ggggtctgcc tgccgtgacc  
67021 ccaaagtcac accccaacc ctactcagaa tacttatacg gttccctga ttctgtggt  
67081 gcagtgaac agagaaagggt gggaaacagg gatgagacca catggctggg gtcagaaact  
67141 tggcatctgg aatgagatgt acagggacct caaggaagca ggctacactg gaacaggaga  
67201 ccttggaat gcgtccttca ttattttgac ctgctaggaa attgcacagg ctctgaatca  
67261 gacatacttg ggattaagta acttactggc tctgtggcct tgggcagatc attttgtctt  
67321 tctgagtttt actttgctca tggaaacaat ggggataata atgagattta agtgaaaggg  
67381 ctttgaacag cgtgcgatat gtagaacatg ctcaataaat cctaaattat ctttcttcc  
67441 ttctttttct tccactcctt ccttccctct ctccctccct ctctccttcc ctcctcctt  
67501 ctttctcttc ctctctcct ttttttctt ttcttcttc ctttcttctt ctttcttctt  
67561 ctccctctct ctttttttct ctttcttcc ttcttctctt ctttcttcc cgtacttctt  
67621 atatctctta tgtctggtcc catgaaaccc tttatttggg gttggggacc taatctccct  
67681 tactaatctg caagtcccaa accctgagaa ttggcatttg attccagatc cagaaactga  
67741 aatgcaagat ccaaactaac ccaatacaat gagtgtccac tgagatctca ctgaactgag  
67801 gccttgggga aggagcactt tctggttggc tttgtgcaa gtgtgtgagg ataagtgcag  
67861 gctggcggag gaattgtggc tatggccccc acatctagaa ggttgggaac ggagggtatc  
67921 agaaagttag gataattttc tggggcttta aatcctggca caaagtaggc acccaataat  
67981 atttgttgaa tgaatgaatg gccctgtcac ttactagtgt tgcaactttg atcaggttct  
68041 ttaaccataa aggccatgct ttactcatga gcataacaag gattattgtt aagaataaat  
68101 gatctaattg ttgtccagg gatagcaagg actgctacgc agtaaattgt aaacagtagc  
68161 taactaagga aagaaggaga ggaaaaggag aagagaagg caagtaggcc cagagtccca  
68221 aagggaagca gattgggggt cctcaggct ttgtgctggc cggagactct aggggaaggct  
68281 cagggaagcca aggcacgtct tttggggcca gtctcttctg ctagggtgtc agctgagaaa  
68341 gctatgagag gcctggactc aagagctttt taaaaaaagg ctccccacgg taaccaggct  
68401 agaagagaga gaggtagctt gcatttctct gtctcatgtc tctaagggtt ttggaggctt  
68461 tctaatttat cctggtaggg gacatgtgac tttagaaactg gcttaggact ctgccatgag  
68521 gcgggggtct gtaagtaaat ctggcagggg aaggagagac acagtccagc ttcccagat  
68581 gcaggttgca catgctgtct ttttctctga ctatatgttg gaggcagtga gtcctgggtg  
68641 gtagaaagcc acatgttggg cactgtgtgg acagacaggc agggagatag cctcttaatt  
68701 cagatcactc aaaactcagt gatgagttta aaaagagaaa gaagactcac aaataaatgt  
68761 atgcacaatg cacatggtag aatgagcat aaaagggcct ggctttacta cagaaatagc  
68821 tacagaaaag ctacggatat gtgtgtgttg ggggttggga tcaattgtgg agctagacaa  
68881 gggagatagc aggcacgtct ctgggggtct gcagtaacca agcagttttt ctggagtctg  
68941 tggacaccaa agaggcattt ggaaggagga tgatctggct tgggaattgag ggctggggat  
69001 gacataccta aggtggaaca gcatgtgtct tggagagtca gcatgggtag ttatgggggtg  
69061 aaagaatgta ctgtaggtgt ccagctggag aagggttctt gaaagtcagc aacatctgtc  
69121 ccaattcaac aaataactca catcaagttt gaattctgtg caagacacta caagaaatgc

69181 acccatgacc aaggcagtag ctggactcag ggatatccac tcttgaatgc tcttgggaagg  
 69241 aagagagttg agacaagtag actaggtggg cgaaggtcaa tgtataaaga ccacacagtt  
 69301 cagggaaagaa ttctctcttg ctatgggaat ccgggaaagc ctccccgaga aagtggatg  
 69361 ccactttctt tttcttccag tcttctctt cttcttctt tcttctctt cctccctccc  
 69421 tcccactaga tagggagtgg gtcttgagga ttggaaagat ttcaacagaa ggagaaaggg  
 69481 gctgggagga catttctttt ggaggcagca tgatgagcga aggcaaggga gtgtggaagc  
 69541 gtgaggacag gatgggaagc agctagcagc ccagtctggc agaaataatg atagtaataa  
 69601 tagtgactaa cactactgag ccctaagtac caggaggcac tgggcaggga tgtgtatgga  
 69661 gtgtggtgcc aggttgtagg aggacttgaa tgccaggaaa ggcttttggg agggtaagtt  
 69721 aacaagcgca gaggggttgg atctgcctgc cgaaggagaa ctgggacaag gaaaggggct  
 69781 gaagtaagaa gtcccacgct gaatatgccg gtagcaacag atagtgaatc ccgagctgtg  
 69841 cctgagggaa gggaaatagaa tctatggttt gaagttcacc gccagcatgg ccaagccctc  
 69901 ctaggccact gtgggctctt gcttccaatc agacatgact ccacctctgg ggctgcctca  
 69961 attttctctt ctctggattc ttggggtttc ttaggattgc gggagataga atggggtcag  
 70021 gggaaagctgc tcttgggttt acaatggtgg cgctcacgc tgcagagagc ccagtgttcc  
 70081 tgcgtggtgg acctctcccc tctctaggag cagctccaga ttgctggagg cagacacggc  
 70141 tgaccggcta gccaggaag cacaatggcg aggtccttag cccctgacct ctgaatctga  
 70201 ccttctctcc agctaaaagc ggaggagagc gcaggagggg ccactgccta aagccggccc  
 70261 tgagctgagt ttattagctg agggagggtt ggaggcggtc gcattccgac tcacagactg  
 70321 gaacatttct gtgatccgct gtaatgcact gggggacact gggcacattg ctgaagtttg  
 70381 atcatagagg accgggaggg ggaagagggg ggggtgtgga gggagaggaa tgggaggaag  
 70441 agaggaagag gagaggaggg aaggaaagtc cttgagaaat tcttttaaaa aaagaaaact  
 70501 ttcaaaatct gcaccacccc cacacctttt tcttttaaat aggaacaggc tggaccttc  
 70561 cgttccccctc agcaggcatg gtgtgtgtgt ggggtgtgca gtgggggagg gctgggcagt  
 70621 gattcaaatc agatcctgga acttctctga ggcaagtcgt gcttatgtgt gtgtgtgtgt  
 70681 ggtgggggggt gtccgtctgg gattccttgt atgggacatg ggacaccagc cgtgtccac  
 70741 tctgcccgcg tgtggctgcg tgcctgtggg ctgtacgggt aatgattct gcccctgtga aacatggatg  
 70801 tccaccccga agccccagtg tgtgtgtgt atgcagggt gcgtgcgccc aggtagctgg gtttccggga  
 70861 cgtgctcgtg tacgttgtgt atgcagggt gcgtgcgccc aggtagctgg gtttccggga  
 70921 attgtgcacg gctcggagcg cctcggcgcg gctggggctc ggagcgcgag ccggcgttcc  
 70981 ggggttcggcg ctgcctcccc ggcagtgccg cgcccccgc cgcatctgg ccgcgcgagg  
 71041 tgtctgcggc ccgcctgtgc gccgcgagg gcaagtgtct ccggggtggg gtgtccagg  
 71101 gccgcgagcg cctgccccct cctccccctc ccccttggcc cgctctcaga ctcagataaa  
 71161 gcatttctct ccattgtcat cctaccggcg gtcgctctgc agcctccggc gactgggggg  
 71221 ggccccctcc cttctctcgc ccgtctcaca gtcgctctgc agcctccggc gagggccccg  
 71281 atgtgaggcc ggcgccccag cccccgcgccc cgcctatgagc ccccgctctc cgccccgcg  
 71341 gcccctggat gcacagcccc ggcgctggtg agtactgggc ggccgcccc cgcctctggc  
 71401 tgcgcgaggc acccagcgct gccgcgccag gctcggcctc cgccctggc cccggctccg  
 71461 gctcgggctc cggtcgggc tcccgcagc cccgcgggccc cagcccggtc tgcgcccccc  
 71521 gaccgcgccc gtcccgcggc gctccgcggg gctctggcag gctccgggtc ggagctggtt  
 71581 ccggggggcc gagggctcgg gcctcccggc gggcgccccc atccgcccgc cccggggcag  
 71641 ctacaggccc aaggagggga gttggaggcc ccggcgccgc gtgtgagggc cccacgtccc  
 71701 atcacccctg ttcccgggga ggacgagccg agggaccggg gagggagggga cggccgagg  
 71761 ggccccggca gggggcggtg ctccggggcg gaagggttgg aagcgcgagg gcaaggggca  
 71821 ggacccactg agttggggct gggctttgtg gggctggaca tcagcgcccc catcccggtg  
 71881 agccgggagc ggccctactc agatccttgc gcggggaaag aggtcccttg gaggggtctc  
 71941 tggttgggag gtttctctga gcattgcccc ccatccttgc ccacccatca ggttgaagag  
 72001 acacctgtgc cctggtgagc tgtggaggtc aatgcgggca gcggcgaggg aagcggggag  
 72061 ccgcaggctg tgtgaggggt gggggagcag atgtgcaccc ccaggcctg gggctgtgtg  
 72121 gtgttgggga gtgtgagagc aggcggcaaa tttggcggtt gggctgggtt cccacgacca  
 72181 gagtttctag gcctgtgggc caggagagag ccctctgggg ccgcaggcc acccagtgcc  
 72241 ccacccccat tgcttccgcg tgtggtgccc cgtttgggtc tgacctcccc agccacggct  
 72301 gctcctcact ctttctcccc gctggtgtgc ttgcgcaccc aaaggcctcc cctgcatct  
 72361 ggacactggc tgtctcgtgc ccaacgctcc ctgcccactc ccctaggcaa catctgctg  
 72421 agggccagct ctgcctgccc ctttctaggg tgagaatggg gcatcgcccc tcagcgggcc  
 72481 tgcgtggagc tcaagatcaa cttctcagcc tgttccctgg acttgcatct ggacctgtgg  
 72541 gaccttctcc agggacctca ttcagctata gggctggcag gagactgtga ctcaggtccc

72601 tgccctccaa tgagacgctt tggcggeect tteccctcc caggactcca taggctgcta  
72661 ggctgccgct acccatgggt tattaagtca tttctctctt ctctgcagtc attctgagg  
72721 gaaactaagg cacagagtag tccagtgag tggtaccag ccagtgaaac ctgagactgga  
72781 accaggtctt ggacctattg ggactggtec tctgccttta gtccctgat gtccctcctt  
72841 gccagcagg gccaggctca gaggcaagct cagagctgcc tcctgatgtt gcacctggaa  
72901 tggctcctgt gcagtgttct ccagaggcct ctgtgtccct tattcggcgg gtgtctctgt  
72961 ggccaccggg tcttacagtg ggttttgggg cagggaagtt tgcagtgtcta agctgttcac  
73021 tccactttga cactgaagtt cagtttcccc atcagtaaaa tggggagaaa attccaagca  
73081 cacttctcag agcagagcag aagaggttga ctatggagag gagaatgaag gtactgtgct  
73141 attatccacc cctccagtt tgcttaggga taatggacct cagctttagt ccttgggtggc  
73201 ctcttggcat ggaagctgga actttctcaa ttctgatata aaacccttga gcaagagaga  
73261 aactcatgtg tgatggggta gggagtgggg accctctggt agctgtgggc aagcatgccc  
73321 aaggacttgg aagacagaag cctgtggaac cccatctcct ctttgccttc tttctcctgg  
73381 cctttcatta agggctggta attttgaagt cggcaggggc ctgagagaag gtgagctaata  
73441 gcaaggccca gggtcacaca gccagggaat ggcaggcgga gggggccaga accaggcctt  
73501 ctactctcgc cagtgcccat tctgctggcc caccctccac agcttggctc tccttggcct  
73561 gccctcagtt agacttcgga ctgaggecct cagtgggggtg tggggtattg ctggaagcag  
73621 ggctgaata aagtctgggg ctagcgggag ggcactctgtc ctcccgagg ctccaggac  
73681 tgtgcatttg tgtgtgttgg atttgttcac tagatggggc acttctcttg gggcaggaag  
73741 ctttgatttc ctgtgtgat ggtgaggagg ggttggaag gattaggagt ggggggtca  
73801 gctctgggcc atcctcgatg ttgtgtttg gaaccacgga ggggcagagt ttctgttaa  
73861 gactgcttct cccagctctg gggaggcagg aaggagagcc ttggtgagga ggcccaggcc  
73921 aaggctggag aaggaggctg tgagagcagt gagctggggg tgggcaacac agcaggaagc  
73981 cggctcagca ggtgaccctg cgggtattg tgttctctg taatatttcc cccctgttcc  
74041 tgtggttaacc ttccctggag gcccaggcc ttagggctac aggaagggtgc cccagacag  
74101 cctttcctt agaggcctga gtattaggag gagtccccag atctagccac ctccctaacc  
74161 cttttggctc cctaggatca ggggcctggg aatctaggcg agtggcctga gtgagcatgg  
74221 actcgcgggc tgggggaagg ccttttggcg tcttctgggg ggaagggaaga gggaaagagg  
74281 ggagctggac gcccggaagg gccctgagca acttgagtcg ctggcctagc ctcttgttcc  
74341 ctcccaaccc atcccactg cctcctccca gtctccctcc tcctacaagg gagaggtggg  
74401 tagcatgctg cctggggcaa ggggcagggg tgggggtggc agaggtggga gggatgtttt  
74461 catcagcaga gcatagtccc tttgtctctg gaccagttcc cagaggcaaa ataaattcag  
74521 gacagcgtct gtttagtgtg ggtctgcatg agatgtgtgt gagcacacac tgggtgcgtg  
74581 gtgggtatct gtgtgtgtac cctccccccc agacctgtg tatgtctgat tgggtgttcc  
74641 gggcaatttg tgatctatgt ggtggtctctg tgttgggtgt tttgggaata tgcacacata  
74701 aaagacagat gtgcatcatc tgtatggtgc acaccttttc aggttatggc cctgtgtggg  
74761 gtaaacatgt ccatatgtat ggacatgttt tttgggggta tatactctggg attctcaaat  
74821 tttttaatag aagtccagat gctggcttgt ctccagagtc acctggggaa tgtgttaaag ataaagatcc  
74881 gcgggttctc ggaccatttg cttcagagtc tcccagcact ttgggaggcc gaggcagggtg  
74941 tgggcccggc gcggtgactt acgectgtaa tcccagcact tgggaggcc cctgtctcta  
75001 gatcacctga ggtcaggagt tcaagaccag cctggccaat gggcgaaac cctgtctcta  
75061 ctaaaaatac aaaaaattag ccaggtgtgg cgtgcgcgcc tghtaatcca gctactcggg  
75121 aggttgaggc aggagaattg cttaaaccgg ggaggcagag gttgcgggtga gccaagatca  
75181 cgccattgca ctccagcctg ggtgacagca agactctgta aaaaaaaaaa aaaaaaaaaa  
75241 tcctggctgg acgcggtggc tttgggaggc tggaaacagg agatcacttg aaggcaggag  
75301 ttcgagacga gcctggctaa cagggcaaaa cccatctct actaaaaata caaatttagc  
75361 caggcatggt ggcgaggcc tgtagtccca gctatttggg aggttgaggc agaagaattg  
75421 cttgagccca ggaggtggag gttgcagtga gccgagattg cgccacctca ctccagcctg  
75481 ggcaatagag tgagactgtc tcaaaattaa aaacattcag atcatcaggc ccattccaga  
75541 ttgactagt cagaatctgag ggggtggggc tgggaatcca gattttaaca ggtgcttcag  
75601 gtgatcctgg ggcaaggctg tgtttgagga ccaactgcctt gggtaacct ctctatttt  
75661 tcttttgagg aaatagacc acagaaggta tctaagacct gtccaggact ttgtgtcac  
75721 agaggagaa ccaagagaa actcaaggct tctaagacct gtccaggact ttgtgtcac  
75781 ccatgtaccc cctgtgtgtg tgtgtgcatg tgtgtcata actacacttt gtgatgacgt  
75841 ggaccgatt gggctgggtg taattggggc tgatctttcc tctgggggtcc tggctttctt  
75901 gttttctgac cttgttcttc ttgtacatt ctgtgcctc ctttttggag aaatcctgga  
75961 actgttagt gtcaccccta aaggtaact tgggaacca ggaaccatg ttgtgagcc

76021 agtcactcag caattcatcc attcactgga tcctagctga gccttgcaat gttctaggca  
76081 ctgggtacag atatgcagtg aacacacagg cacaacatct gacctcaggg aacttccact  
76141 ctcggtggaga agacaaacag aacaagtagg caagtaaagg aatgagtatg tgtgactagt  
76201 tacacactgt gataagccct aagaaggaaa tgaactgggc atggcaataa agaataacaa  
76261 ggtgggactt cctttgatag ggtggccagg ggaggactgc ctaagaaggt gacattgatg  
76321 ccgtctccca cctccccagg ttggaagtga gccatcagag cctctggagc cgtgcttgtg  
76381 aactccctgg atgcaggtgg aggccctggg ctgaccaatg gctaaggytt ggagctgaat  
76441 tgccagcctc tcacttggca tggaaagtgg cagtctctc cccttaagca gcccacaaagg  
76501 ttggcagagg ggagagcaga agggggagct gcacaaggcc aagatcaaag ccactccctt  
76561 gcttggggag cacccttttt cttccatggg gctgagtcca gggccctgtg gccatactga  
76621 atgttgagaa ggaggcagca tctccccagg agctctcctg ttccacctc ctcccacctc  
76681 cttcccttct ccgccatctc ccagttggg gaactactgt gccagtgcc ttcctcttgg  
76741 tctagcctgc tgccctctgt gccactttac tttacttggc tcaggaatca ccaaagagag  
76801 ggggtcaagg cctagagggg acctggggcc tggaaagagag gacagaacca gaaaggaagg  
76861 ctggggttgg gaccagagag gacagggtc aaggaggat ggaggctggg acaggagagg  
76921 cacacgggaa aaacctgagc ccagatggcc ctttggctgg gctctccaga gtctctcctg  
76981 ggcccttggg atctgctgcc caaactgggg gagactctga gaccagaggg ccagatgggg  
77041 ctgattcaag acacgggctc tacatcagct gggaggaaat gccctgtct ggtccacctg  
77101 cagctctacg cttcaccct ctcaggaggt taactttcac atcagcaact tgggtgtcag  
77161 gttccggctc taggccagca ggccctcagc cctctcacct ccaacctctt ctcccaggaa  
77221 ggtttttctg gggacccaga gcttcaggt gcaggaagggt gttgcctggc ccttgctta  
77281 gattattgag tgtcaaagga gccctgactc caggtccgct tttccctctg cacactgcca  
77341 aggtgcctt ccacctggg cctctctgga ggtctctcag tgctcttccc gactcccagg  
77401 ccttcccgcc caagctccac agccccaca gcaggatggg gaggggactt ctctctgca  
77461 ggaagggcct gggctaagct caccatcccc accctgtctc cgcaccactt ccttttctt  
77521 ccactctgcc tgcagggatt gtaaaccctg gtggtcagaa gctttggggc tatagggtea  
77581 geectctacc ctggggatcc gtagggggaa tccaatcccc ttcagttcag ctctctccct  
77641 gcaggaccca ttccaaggag cctagctctg gctctgagg gacccacgc tgaccacgc  
77701 cattcccctc taccacaacc ccagaaatgg caggaggagc agggcagtct gggagtga  
77761 ggttcggaaa gactctgggg tgggggaatt cggcgattgg gctgtaaccg tcttgttttg  
77821 cttgccccac aaacctgcac gtccgggacg tccgtctgcg cctcccaggc gcgttcagg  
77881 tatagaactg ctctcagaat gacaggctgg tggcaccgg ctggggcggg ggggtggggag  
77941 gtgaaggggg gagccccagg caagggggag ctggagggtt aaaaatagca gcagccttgt  
78001 ttcggttagc aaatgtggag gcggggagct ggaggcgggg cggggcgggg acgatgttg  
78061 cccgcagcgc agggctgtgc tccccctggg tccccggagt gactcacggc ggagacgtc  
78121 aggaggtgct ggcgcagcac cccaccccca cggggcgagg ggtgagcgc aggcctcgcc  
78181 ccccagattc cagcgtgaa ggaggtgtga ctctccctc caggcagccg gggccgctt  
78241 gagagtgagc caggggcatc gtgtgataat agggaagaaa tgtgccattc tgacgccaga  
78301 gatctgggtt tgaatcttag tcgaaagggt tgggatcttg agtaaggatg ctgatggctc  
78361 tgagactcga tttcctagt tcaagtgggg cttttctctg tgccccactt agtgcttaa  
78421 gcaacttaca gatgttaatt atgccttag accctactgt atatatggca aagcctggca  
78481 ggagagcttc ctgtaaggac gcagaggag gaatgggatg gccttggtg agtctcggtt  
78541 tctctgcaa gtgtgattat gggcacattt tgctctgtgc ctccacttct tcatctgtaa  
78601 tgtgaaaata attacagttt caactttatg gagttgctat gaagattaaa ggagataatg  
78661 taaataaagt tagctctgtg cctgggtatga agtcagggt cactgaatat tcatcatcat  
78721 tattaatgtt attgttcata ttttttgaag gtcagggata ggggaatgtg cagacacgaa  
78781 gaacagaaac tgggcctagc ccagttcac agaaaaaacc aggccaaatc cctgttccag  
78841 attcctccac ccacgcggc ctggaacagc cagagagctg tagccagaag tcataggggtg  
78901 gaccctgtct tctcttgttc actccctctc ccagctctc ctgagaggc gctgctgtgc cagcttgggg  
78961 gggaccccag ggccttgaag ccagctggcc ctggagagg gctgctgtgc cagcttgggg  
79021 agggctctgg atggggctgc ccctgatggc cctgatgtgg agtaccttgc cagcatctgc  
79081 tggggtgaac tttatttttag cccttccctt gttgctctta tgaagaacag aggggggtg  
79141 ggcaggtcag tgatgtcagc agtgagtatt cccagcacag cggctctgga agaggcatga  
79201 ggcatttctt tcaggaaatg atcattatc agccagaagg cattcattaa gtaagtctg  
79261 actttgtgcc cagctctgtg ttataggccc ttggcgagac tcaggagggg cagaggacgc  
79321 taggttgtag ataacacgga acctcagagg atatatggtc caagaagacc cggggcggtt  
79381 gaaaaccctg tggactaatg ctcacgggag cccgaggtca cactttgact ttgctaccat

79441 gggctgtgtc tatgtacgta tatatgctgc gtaattatta cagaggcagt ccatgtgcat  
79501 tgtggatact cagacaggac agaccagcaa aaactaaaaa ataaaaaaca tcacagacgc  
79561 atcagtcaga gatcactgca catctttcca tttccgtatg tgtctttatg tgttgaatt  
79621 tttatgaaaa tgagattact ctgcatacac tgtttttcca gtcagtgtt tccacctcc  
79681 attacagtaa attttcatct taacggaatt cccagttggc cagaaattgt ccttacagct  
79741 ggtttgctca aatcagtacc caggaccatg ccatctgtct gttgagtgtc ctgaaggcag  
79801 tgtaagcacc ctactggat ttgtgtctg gaaaaacccc ttcaaccaag tctcaagggc  
79861 agcctggctg caaaaggga tcaggctcag tggagaatct gccactaga cttctgtgt  
79921 cttccaaagt aataggcaaa aggggggga ttttagggca ccactgggat gggacctcta  
79981 gggatattac tgtcattaat gttaatgtg catccctgtg agtgtcagga ttcacagctt  
80041 gtggctattc acatccgaga tgcctcagt cggtttgect ggttcttact gagtgcagac  
80101 cagggtctcc attgtggctt ctgcttctct ctgccccaga tccagggatg ctgatagccg  
80161 tgcggctgtg ttcctagtcc ccagaaagtg gccctgaagg taggtgtctc cttttgact  
80221 tgtgggtgct tccagcgctt ccacctgcc aaggcctgcc cgtgagtgtg agacagagat  
80281 agagatagag agagagagag agagagagag agagagagag agagagagac cttttcctc  
80341 caagagaatt taccctcgag taccactct gaggtgtact tgcctgtgt atgcaacctg  
80401 cattttgtag agggcttgac agtttccaga gagctcacgc agcgtttgat cctctgtggc  
80461 agccctggga ggtttgctt tttagtata ccctgctgga ggcagctaac aggaaacact  
80521 gtaaatgtt taaatggtac actttaaaat ggtaaaatgt acatttaaaa aggaaggga  
80581 atagaagatg aaaaaggaa tgaggatggc aggggtggaa cacagcacac tttgtggga  
80641 caggctggca ttgggagcat accctagggc ctactgtgt cttgcatccc cttgtccct  
80701 tgggtgtctc acctcagcca ctactaggag gcaggctgag taagcagtcc acgccagtgt  
80761 accgatgcta agcttaggtt ctggagctcc agcagctcca cataccatct gtgtgacctc  
80821 agcaagtttc tgaacctctc ttagccttag tttctcatt tgcaaaatga gaataataac  
80881 agtatatagg ccgggcgag tgggttcacgc ctgtaatccc agcactttgg gaggccaggg  
80941 tgggtggatt cagtgtgtc aggagtttga gaccagcctg gccacatag tgaacaccg  
81001 tctctaccaa aatacaaaaa ttagctgggc atgggtggct gcacctgtaa tccagctac  
81061 ttgggaggct gaggcaggag aatcacttga atccgggagg cagagggtgc agtcagctga  
81121 gattgtgcca ctgcaactca gtctgggtga cagagtgaat ttctgtctca aaaacaaaac  
81181 aaaacaaaac aacaaaaaaa cagtatctgc cttacagagt tgtgaggact acttgcaata  
81241 gtacaattaa aatgtttagt gggggcctgg tgtgtgtgct caggcctgta atcccagta  
81301 tttgggaggc agaggtgggc ggatcacttg aggtgtggag ttcgagacca gactaatcaa  
81361 cagggtgaaa ccccgctctc actaaatata caggagaatc acttgaacct gggaggcaga  
81421 ctgtaatccc agctacttag gagctgagg caggagaatc acttgaacct gggaggcaga  
81481 ggttgaagtg agccaagatc gtgccactgt actccagcct ggggtgacaga gtgggactcc  
81541 atctcaaaat aaataaata ataaaaatcg cttagtggga ggtgtgtgct cttccccgc  
81601 caaaaatgcc taggataata gccagcacac agtaagcatt aacacatgat tgtgtatcat  
81661 tattaatatt attaatat taaaaataa taactattgt tgatattgta acttaaacat  
81721 ttcctggcca gtcttggga tgggtgtcgt ggcctgtggt gttggcacagg tgagaagagt  
81781 gaggaaggca catctcgctc ggcctgcagc tgggagaggc agaaccagtg ggcaaaagcag  
81841 gagtagggtg cacagagggg cagggtctgc atgaggaggg cccaggagct ggggtgacaa  
81901 ggagagcaag ggaatgagtg tgacacctca gaggggagaa ggagccgcc ctagaggcag  
81961 cctggggcgg tgaactgtgt tctgttggg gcaaactg gcccttgaga aagactggct  
82021 cacactggct gctaaaggag caactgtct aagtgggca ccagaggggt aaaggcgaag  
82081 gggagagatg aaggcagaaa ctggccgact tatccccatg ttacagatag ggcctcaaat  
82141 cttgcctgtc caggatgttt tgcttatgat aggaagatg gtagtttagac atcatggtga  
82201 acttctatc tcagggactg gagatactgg agcagaggag tgaggatgaa tgtggaactt  
82261 atgtctttga gggctttttg gaactgagaa atcttagggg agtgtggact aggggagccc  
82321 actggctcag gaattcccta agtgggcaga gcagtgcagg ggcaggccag gctataagct  
82381 gaaggccatg ggtaatagga agtagatgca ggcctccag gcctgccacc gcaggagga  
82441 gctatgccct ccccttcaca atggacttgc aggggaaggct gagtgtgtgg caggaaggtc  
82501 cggggagtgt gacagggtgt ggaggacccc tgtttttctc tgtcagagga cagcaagggt  
82561 ctccagagag tgccagacct agaaaccgac agccatacgc aactcagaat ggcccagctc  
82621 cccggcctca ggttctgcca ggtctctatc cttgaggaga ggccacaggg tggagctggg  
82681 gatctggggt gggggacaaa gaaccaggga ggatgctttc ccaccccccag ggagctcaag  
82741 ccgtgctgc catgggttaca tctgttctct gtttgattca tctcaaacag cagaagtgga  
82801 ggtgggggtg gggggcgaca ctggctccca gctcaggcca ctgctgcgtg gggctgttta

82861 caacagccgc atgtgggatt cccagaaaga gactccaaac cggacatcct gcggtcgcaa  
82921 aatacccaagg tgtcaagagc taaaaatagc tgccctcagg cccagctgac cctgaggtgg  
82981 cggagaaaga ggcattgctca ctgttgccac ccttacatcc agcctcctgt ttggtgtgca  
83041 ggagcttctc tgcctctctg cctcggactg atggaggcct tcgtctgggt aggcagacat  
83101 cccggtcggc tcacctggca gctgagcctc tgccctgatg ggcagctggc tcctctgctt  
83161 atacagagaa atgggtgcagc ttgctttggg acgctaata gagagtccta gagggacttg  
83221 ggagcttcta gagaaggat atggcagggc actgagagca ggggagttgg agctgagggt  
83281 cctctaagac cccaacccat tgccagccc ctgtttccag cacacagtcc caaatcattg  
83341 cttggtttct acaaagtcaa cagttgctcc aaatgattct ttgagattgt cttcatgggc  
83401 acccaaagat gacatagctt ctgcccctc acctgcgcag ggctggggat tgctgctggc  
83461 acgggtctct gtggggctgt gtgatttttt ttttccatct ttctgcatgc ccatttaggt  
83521 cctgcatgtg tcctttgctg gctggcctgt ggcgaatggg aatgctgggg aggggggtg  
83581 gagtgtattg gttgagagcg tggattctga agcccaattg cctgggctca agtcccagct  
83641 caacctctgc cacttgtctg tgacctcaga caagtatct aataactctg ggcctcagcg  
83701 tactcattta tctaattggg ataaaacagt aaatacctca taggtttgtc atgtggacta  
83761 gataagttag caaatgtagg gtacttagaa caactcctgg cacataataa ggtgttcgct  
83821 taaaaaagtt cagggtggaag agaaagggaa gagagcatag ttgggagagg ctggggataa  
83881 gagatagggc agggggctgg gcacggtggc tcacgcctgt aatcctaaca ctttgggaag  
83941 ccgaggcagg caaatcacct gaggacaggg gttcagacc agcctggcca acatggcaaa  
84001 acaccgtctc tactaaaaat acaaaaatta gctgggcttg gtggcttatg cctgtagtcc  
84061 cagctacttg ggaggctgag ggaggagaat cacttgaatc caggaggcag agtttgagct  
84121 tagctgagat tgtgccactg cactccagcc tgggtgacag agcgagactc catctcaaaa  
84181 aaaaaaaaga gagagagaga gagatggggc aggggcatgc attcaggaga aaatggtctg  
84241 tggtagagga gggaggagag ttgggagcag aactgaaac gctaattgcca ggaaggaggc  
84301 tgcagacaag tacaggaggc aaactaatac tcgctaccac aaggagacac ccaccatgtg  
84361 ctgggtgcat cacagacagc attgctaata tcagggtgacc tctttgaagt aggtattctt  
84421 tttgtttgtt tttgtttttg tttttgagac ggagtcttgc tctgtcgccc aggtggagt  
84481 gcagtgggtg aatctcagct cactgcagcc tccgctcct ggggttcaag gattctgtg  
84541 cctcagcctc ccaagtagct ggactacatg ctcccgcga ccatgectga ctaatttttg  
84601 tattttttgt agagatggga tttcaccatg tcggccaagc tgggtctgaa ctctgacct  
84661 caagtaatct gcccgccttg gccagggcag aacttcccca aagttctggg attataggcg  
84721 tgagccacct cgcccagcct gaagtaggta ttcttatctc ctgattacag gtggggcagc  
84781 ttaagcaggt taaattgtgt ttctggcttg ctttgccagt caccgaggga gtcggggctt  
84841 aaaccaggc ccatctgacc gcaaagccaa tgtcctgtgt gctttagacc tcaattccc  
84901 tcacagtttg tggcctgcca gacttcatgt ggcaggggct tccagccac tctcagctcc  
84961 ctgctgggtt ctggataaat ctgagcaaga agcattcagt gccaatcaat gagcagtata  
85021 gagaatttct ggaagggaga cacaagaagc tgttagaaag ggcggcttcc agggaaagttc  
85081 tagggagctc gggatgaatg agaaacttat cctaacaact tttgggctct ctgaattttt  
85141 tttagtatct gcaagtattg tacttggtca aatatgttta aggtgcagg ctgtattcta  
85201 aactccttga aagtgagaac cagggtttcac tcatatttcc atcttttcaa cccctagatc  
85261 agtgacttcc cagggaagta gtacctgcat ttgggggtga cctttgggtt tcccctgtac  
85321 tggctctggc tggcctggct ggaccactgg ctggctgggt ggctgtgacc tagccccctc  
85381 tttctctttg ctctctgtgc aaatgagagt gttgggtctga acgatctcta aagcctggaa  
85441 gaggagcaga tcctctgtgc tcagccccc ctctgtgtca gggaggcctg gcaaccacag  
85501 tgttctttct cctgtttatt tgttcttggg tcttctgaa gccatttcc caccagcctt  
85561 catcttctct gccagcccca tggagactca agctttttcc agcctatgtc agggaaggag  
85621 aaccagagac agcaacctcg ggtgtgaagg gagtcaagtc tgaacccagg actatggcct  
85681 tctgccactg cctgctttcc tcttgtgtgt ggggcctagg tcttctgtct gctgcttctt  
85741 tttccgctaa tcaagagtcc agggagggtg gaacagcctc aacaaagact ttgaagatga  
85801 gcggggagga tcgcttgagc ccaggagccc agcctgggca acaggggaag acttcgtctc  
85861 tacaaaaaaa aaaaacaaca aaaaaaaca aaaaaattta gccaggcatc gtggtgcata  
85921 ctgtagtccc agctactctg gaggctgagg caggagaatt gcctgagccc aggaggtcaa  
85981 cgctgcagtg agccatgttc acatcactgc actccagcct gggcatcaga acaagaccgt  
86041 acctcaaaaa aaaaaaaaaa ttaagaaaag aactggagg catcgggagg gggcgcttct  
86101 aggtggcagt gctcctgggg aagccttttg tcccactgaa gacatgaag tctgggaga  
86161 gcaggtggtc ggcaaggctc aggttttcat ccaccttttg cagatctagg aggcaagtc  
86221 atacctgctg gggaggggagg accaagactg gggcctgagg caataaggta ggagcagtag

86281 ggaggtcagt ttgttccagg tgcttagaat tgtgtttgtg tttactctgg aggttgctga  
86341 gggctggggg gcacctattg gaacaggggc tccataggtt tctgggtaaa atcaggtgtt  
86401 ctggtttaag aaggtgactt ggtaggccca catgccccag tgccaagtaa actgttctta  
86461 agtctgactg cagtgcctc caaagaagat agaaaagggg agtagccagg attccaaaaa  
86521 gaagagctct ccaacctggc aaagagccct gtgctagaca gtattcctgg taccttgggt  
86581 ccatttactt ctctttttt tttttttt aggctgacct caaattagta gtaacagccc  
86641 tcggagagag gcagtgatgg gaaaagaggt cccacactca agccagaact gggaggcagg  
86701 atgttcatgc tctggcttca gttagctac tgacgggggt ccagtagata cctttctct  
86761 ctctaggaca caaagagagc ttttctggg tcttaatctc tctcgtctg cgctctctg  
86821 aacttgatgg ccctcagcac ggggccaggg agcgggggaa aagcagaact tttccaggga  
86881 attgctattg gaagcagccc cgttgccaac acgcatgcac acatgcacac agcttttctg  
86941 gacagacctt atattatgga ttatccacac aaaacatccc tttggggcct ggtagccac  
87001 accacagaat tcagggtcat taatttttct cctatccaga gagtgcattg tgcgggaat  
87061 ctgtggttac caggggagca aggcacagag aacctggctc tgctcccaag catgaatgct  
87121 gctgaccagc ccctgggtag ggactgggga ggtgggacag aattcccagg aggcagggga  
87181 ctgagctga cacagtctct gggagtgcac cctggagccc agtccagaaa cctctgggag  
87241 gaccaggtcc tgcagaagaa agaagaggta ctaagaaggc ctgggattgg gggttaccat  
87301 gtcgtgggga ggggagttt cctctgaggc agagtcatgt tatttgattt gtcagctact aacagagcct  
87361 ctgaggcagg ttgtcaggag agagtcatgt tatttgattt gtcagctact aacagagcct  
87421 gccacgtgcc ctgagagggt tttggtgcag atgggcatgg ctccacagg gcaccacaga  
87481 gatcatgatg aatgaagtgt caaggtggta gacacagagc gagtgtctgt gaaaaggaag  
87541 aggggagagg tcaggagag cctcccaagg agatggactt gggctggacc tcagaggatg  
87601 ggcagaattt aaataggtag agcagcattt tcggaccgaa ctttgttacc caaagcatgg  
87661 gctggtttga ggggcagtcg gtgggagctc ccctgtgccc aggctgcccc ctccccagc  
87721 agcgcctgcc tgcaggaagt tctcatttct cggctctgaa gaggaactgt ggtgcctct  
87781 gagacacaga cccaaaggag caccctggca gtttctcaaa aaatatccct tctgccccaa  
87841 gtctggccag cagagcgtt ctgtgtccac ccagtacccc gtccaggcag cctctgggtc  
87901 tcttggcctc ctgtccctt gacctgaac tggacagcaa gagggaagg tgtctgtcct  
87961 ggacaggtgg cctcaggact catctctgtc ttctccaacc ccagctggcc tccatgtccc  
88021 ctgggggctt tctgctgctg accagcttgg gccctactat aggttttctt gctgggctta  
88081 ggagccttag agaggttagcc atttccaaaa gaaaagattt ctatctcaga ttatctggga  
88141 aagaggctga gtaggtccct tctctgagga tatggggctc ttgggctgtg cactcctgac cttatcactt  
88201 gggaggaaaa gggctctgcac acttgacctc cgggcatga cccagtcct cccctactct  
88261 cacagttccc accagatctg acttgacctc cactcccacc tgggaggctc tgagcaggcc  
88321 ggaaacctct gtgtccctc tgtcctctt tttctctcc tgctccccca gccatcccc  
88381 agggctccct tctccaggcc tgtcctctcc tttctctcc tgctccccca gccatcccc  
88441 cagccaggct ctcccacctc tggccccacc tcacctcttg gcttctctt ttcctctggg  
88501 cgatgggagc ctgggttggc tgcccaggga agattgtatc tgaccacagg agggagggt  
88561 gagggcactg ctgggtgagc tgaggcctcc ttaggttctt gctgtagtct gatttcaagt  
88621 catttagaat gagtacttg aggaagaggg agctgggagc ccttttcacc agcaggggga  
88681 ctggaggagt cgaatggggg ggggtcttct cgttttgatt agcttctggt ggaggtccca  
88741 ggtcttggcg tgctcaagct tggagtggca gggagcaggc ctggcttgac cttcttctct  
88801 tctgtctccc tctctcacc cctccctgca gctcttcac tccgtctctc tctctacaga  
88861 tgggaccag gtgagcccg gtgcccacta ctgcagcccc actggcgag gtaagagtca  
88921 aacccggggg agtccatggt agggagtggg agatgagggg tggaaaggct gtaagaacgc  
88981 gagaagctga ggggttagag aagcagggtc gctggctgat ctgccagaga gccaggaggt  
89041 ggcggctcca gggaggggag aggagccggg gtaagagagg cagctctgga tgctggctgg  
89101 gcacagtgtc aggaacaca acaggaaaag gaaacacagg atgcccgtct tgccttctg  
89161 gggagcagtg aaacaggaag gaaagtaaga agctaataat tatactgaga cccctacccc  
89221 atgtcaggca ccaggcaagg tgtgttcttg tgtgtggact cggctctcac accggctctg  
89281 caaggtgggc atggcagccc ttgcaggact gctctgctgg aggggaagtg tctctcact  
89341 gtctgcgct cctccctctg ctggcccgag cctcctctgc tgtaggctg cctggggaa  
89401 ggactggact tctgctgct gcttgggtt aggcacatgc catggggcca ggtctggact  
89461 agacgcggtc tgcccttct ttagttagtc cagtatcaac caagggccta ctgagtcaa  
89521 gataacagc ctgatgccta ataattccat atagcaggga gaaatggaac ccaggtatcc  
89581 tcttgtcttc agtctctggc gttgaaaagc taacaggcag gttagggagg aagcacacac  
89641 aaatacaag cgaaaaaaa tagaatgcaa taatgtgacc agtgcccaat gagaggacac



89701 tgattcatga gtttatccat ttgttcaaga atcattaatg agttctgtct ctgtgccagg  
 89761 gtactttcct ggacatttta ggagagacac tgattttattc attgatttta tgtttgtgga  
 89821 gtgctgtca tgtgctaggt actattccag gtgctaggaa taataaaca agcatgaaac  
 89881 caactccctg ccctatggag ctttaactcag acatggtacc tgcccacaga gcactaatcc  
 89941 tgggtgtgga cagccatgtg attggagtcc aaaagaggga gggatgctag gcgctggctg  
 90001 ggtccaggga tgagggagga ctccagctga gctttgagca aagagtagga tttggaaaag  
 90061 tagaatgtag ggatgaggac agcacaggca gggggacatt gtgagcaaaa ggtcagagaa  
 90121 cagaagagat gtggatttgt gacaggtgga agctgatggc caaggtggag ggttcatgtt  
 90181 caaatgcaga ccaagttgag agaagccaag ttaggaccag attgtggagc ctcaaaatg  
 90241 ctaaagcacc tcgaaaagta tttccagggc tccaggcaga gcccatcctg tatteccttc  
 90301 tgctgtggag gcagtggcca tgcagagtgt gaggggaagg gccctgctg ggggtctgct  
 90361 cacagtccgt atgtggctga agccactggc cttgggtcca ggtcgctggc cttggttccc  
 90421 ccaagccctt cttgcataat caggggagtc accccgggaa gccaggacac agaacatgga  
 90481 aggactgaaa cttttcctgg ggcaggagtgt ttttggattt cgaacccag actcaaccg  
 90541 aatgagaaac cggatttctt gggagggaat gtgaacaagg ggtggggcat caaagccata  
 90601 cattttctac tgcgggaggc atctgggtgc acagccatca ctgtccctcc aggcctcttg  
 90661 atattcgggg gacatggcgg gcacctcctt gctgggctcc tgtcttgtgt ccatgtcaca  
 90721 gtcagggaat gttagagtga atgcccctta atgacagcct actgcaaac cctctttgct  
 90781 tagtgagaaa gcccttgtag gggagggtgaa ttctgaaag ttgtgggaa actggagtac  
 90841 ctgccttggt aggaccagaa ccatgtctag ctctgcccct agcagggtga ctttggacag  
 90901 ggcccttcac ctccgagcct cggtttctct atttaggata acaagatagt aatgactacc  
 90961 cccggggggc agtggcttga ttagctgtct catgcacaag tgctgtagat gtaaagattg  
 91021 tggtaggag tggccagctt gggcctggag gctatgattt ctgactcctg gactggtact  
 91081 ttgccacagg cttttccagc cctcctcagc cccaatccct gaggacagtc tgtggctgcc  
 91141 cactggggag atgcccagcg ttggaattgc tgaaggaggc ctctccagga aggttctctc  
 91201 acttgtgtgc cctcccatgg ggcgggctg ctctaccccc acccacttcc ctttctccag  
 91261 gataagcccg ctgcaacagc tccgtctccc agtgtctcag cctctctggc tgcacagccc  
 91321 agcctggtec agctggttat gctggcatgc accctagtct ggtggccagt tataaatagc  
 91381 ccctgcaccc acagccttgg cagggtgctc ctagtgtggg tgcagaggac acttgagaag  
 91441 aggcagccgt gcctgccatc ctgaccatgc caggcccaga gctgccatgg aggcacccag  
 91501 gagcaggccc aaggacacat gggccctatg agctgaggaa cctgccctgg gcacagggtt  
 91561 ctgcaggccc aacgtggcgg gtcagggtcg gctgtaggct tgaggcatca ctttatctca  
 91621 tgactgggga tagagcatgg gaggtgtggc acccagaggg cctgtgaggg ttggggctgg  
 91681 aggcagaaca aagtggcctt gtttgcttgc ctgattgctt cctttgagcc caactcatta  
 91741 gagggcagct gggcaaatcc tctgattcca gggagggatg aaggaggagg gaaggcaggg  
 91801 ccaagaatgt cctaccatag gatctgcagc ccatcgagga tcaactgtag cctcagcccc  
 91861 cggcccaggg aggcagcatg ttagtggagg agcactgtgg tggagtggga agactccgtt  
 91921 caaacaccac cagtgtatga gtgttactgt gcacagtcca tgtgactttt ttctcagag  
 91981 taaaatggaa ttgataatac ctacctgca ggaccacgac aggattaagt gaggaaaaac  
 92041 ccccatgaga gtgttttgcc attgtcaagt gagcctgagg gaggctgagg ggggatcagg  
 92101 ctgtatcatg ccccagagg caaactttcc agtttaccct gctccctctc tctgtcccta  
 92161 ggctgcccc aagcctgtgc agacacacca ggcctcagc cgcagcccat ggacctgagg  
 92221 gtgggccagg ggcctccagt ggagcccca ccagagcca cattgctggc cctgcagcgt  
 92281 cccagcgcc tgcaccacca cctcttccca gcaggcctgc agcagcagcg ctgggtggag  
 92341 ccatgagggg taaagatgga gctccctgca tgtggggcca ccttgagctt ggtccccagc  
 92401 ctccccgctt tcagcatccc tagacaccag tctcagtcct caactccttg tccctttctg  
 92461 ggctgcccgg cctgccacca gctctccatg gacacgccga tgcccagatt gcagggtgga  
 92521 cccaggaac aagagctgcg gcagcttctc cacaaggaca agagcaagcg aagtaaggag  
 92581 gtggccaccc cagccagcgc cagcccccac agccagggtc ctgaggctgc ctgtgtggct  
 92641 tgtgaggggt gaggtgggag ggcggcagcc agctgggctt gagccgagcg tttccctctg  
 92701 cttgcctggg ctctgctgtt gaatgtgtgg gggatgtggg ggtggggggg ggtgtctgga  
 92761 ggctctaggg aggggtaggg cctcgggctt ggctcttgcc tagggagtcc ctgggacgcc  
 92821 tctactgag gatggggaca gggcagtgcc caggtagtgc cagcaggccg cctgtccacc  
 92881 cacctccagc cccctcctga ctctgcccct acaggtgctg tagccagcag cgtggtcaag  
 92941 cagaagctag cggaggtgat tctgaaaaaa cagcaggcgg cctagaaaag aacagtccat  
 93001 ccaacagcc ccggcatcc ctacaggtaa caccctctc accctgccct ctgtccccc  
 93061 atgcaccctc cacccccggc cccgtgttag ccatgagcac acacacttgc ctcttctctc



93121 cccagttgcc acaaccagtc cttacccttc ctctaaacat aatgcccccg agcccccttc  
93181 tcaactgata cctgcccccc tctctttaa ttctccccac cccacctgag ccttctcac  
93241 acacacacac acacacacac acacacacac acacacacac tactggcttt tttcttgac  
93301 atgagcccc tctctcttta tatcttccct gagcgcaaaa atgtcctggt tcccagagca  
93361 gggtccctagt gcaggtgaca gagccccag tgggctcttc acccagcac caagcacctg  
93421 gcttctatgc ctaggtcaga gctctgcaat atagctgctg gageggacag gcggccccact  
93481 gctgccacct ggagatggtc cccattccta ccagccccac attgcccagc cctgcccgt  
93541 gcagcctccc cctcaggtcc cagggcccgt gctcagggca gtgcccgtgc agtgctccca  
93601 cacctctgaa gcagccttgg cactcgttct gtgaaccct ggagccccctg gagacggaag  
93661 gagccacccg ctccatgctc agcagctttt tgctcctgt tcccagcctg cccagtgacc  
93721 ccccagagca cttccctctg cgcaagacag gtgagctgaa caaacaggcg gacctttcag  
93781 gcaaaggaag ggggaaggcg ctcggacatg ggggaggagt gtgcaggggt gggcgggctg  
93841 ggctgggcca ggagatcatc ggtaggctag gatcttcttt ctagtcttgc cttctcttcc  
93901 cttgaccgat agagatgact gggactgagg ggttaaaggg tggaaaaaag aagggtggtg  
93961 ggggctgag tgacgctggt gctccctgca gtctctgagc ccaacctgaa gctgcgctat  
94021 aagcccaaga agtccctgga gcggaggaag aatccactgc tccgaaagga gagtgcgccc  
94081 cccagcctcc ggccggcgcc cgagagacc ctcggagggt agggccgggt gagccagtgc  
94141 ggttgccatc ctcaaacctg gctggtcttg tcccttggg tccagccccca ctagacagg  
94201 ggtccccctc ttaggactgc catgctggtg tgcatggggg tgtccacac acttgccgaa  
94261 gcgggggagt tggggctgaa acccagctcc tgctctgta gctaaggatga catctccag  
94321 aaaaggggac accctcaaa aaattatgca aaggtgctgt agggcaaggg tggcctgtct  
94381 tcttctgct ctgatgggaa gaaagcagga ggccggcgcc ggtggttcac gcctataatc  
94441 tcagcacttt gggaggctga ggcaggtcaa tcactgagg ttaggagttt gagaccagcc  
94501 tggacaatat ggtgaaaccc tgtctctact aaaaatacaa aaattagcca ggcacggtg  
94561 tgcatgctg tagtcccagc tacttgggag gctgagccag ccatgcaact ccagcctggg caacagagca  
94621 aggtggaggt tgcagtgagc cgggacgtg ccatgcaact ccagcctggg gtttaaggaa  
94681 agactctgtc tcaaaaaaaa aaaaaaagaa agcaggaagc aaaggtgctc gtttaaggaa  
94741 ggggtgctcc cgggtctcct gcaccaggcg gcctggctgt accctcctgc ccaccctggc  
94801 ctctgactgc acttccctct ccccccaacc ctcagactcc tccccaaagta gtagcagcac  
94861 gcccgcacatc ggggtgcagct cccccaatga cagcgagcac ggccccaatc ccatcctggg  
94921 ctcggaggta aggccttgcc gagactgggc tctcctgggg cagttctgag cctcagcctt  
94981 cttccagcag gcggccctac ctgggctggg gctgcagggt ctgggacagg tgaccctcgc  
95041 cctcctgggt gttctgggga aggtgcgcgc gggtagaggt ctgggacagg tgaccctcgc  
95101 cctgctccct atggcaggcg ctcttgggac agcggtgcg gctgcaggag acttctgtgg  
95161 ccccgcttgc cttgcgcaca gtgtccttgc tgcccgcaat cactctgggg ctgcccgcgc  
95221 ctgccagggt gagtggctgg ggtgcccacc cccactccaa gccccccag cttctttcac  
95281 tcccttttct tgcctgctca ccccatcatc ttcattgttc tctgctggaa tcttctccc  
95341 cgtgaactct cccgcctctc cccagggctg acagtaccg caggaccat catggttgg  
95401 gccctcgggg gccaatcctg gggagcccc acactccct cttctgccc ctggaccct  
95461 agcccagaggc tgggggcacc ttgcccctc gcctgcagcc cattctctc ctggaccct  
95521 caggctctca tgccccgctg ctgactggtg agtctgctgc ttcttcaggg aaggggctgg  
95581 gtccctgcac cctgctaaga gccaaagctt ggatggacc atccttctc ccatctctg  
95641 tccccctgtc ctgcgcattg ccctgctgca ccctggcccc ccacctata ccctcgttc  
95701 cttccattgc tccctgtggt tccctcctta ttccaccccc cgattcttcc cagtgcggg  
95761 gcttggggcc ttgcccctc actttgccc gtccttaatg accaccgagc ggtctctg  
95821 gtcaggcctc cactggccac tgagccggac tcgctcagag cccctgcccc ccagtggcc  
95881 cgctccccca ccgcccggcc ccatgcagcc ccgctggag cagctcaaaa ctcacgtcca  
95941 ggtgatcaag gtgagaggaa ttgggcagtg gaggtattga gggagtgtt aactggggg  
96001 ttaggggcca aaagaagagg ggtacttaga aagggcaggg aactggaggg caaaagagg  
96061 ggatgtggct tcttggggcc cagagctgca tggcagctgg agtcttagca agatgactgg  
96121 ctgctgggcc cagcccacca cctcccacc catgccccct gctccaccat ggcttctcag  
96181 ccaggttctc cctccccag aggtcagcca agccgagtga gaagccccg ctgcccagga  
96241 taccctcggc tgaagacctg gagacagatg gcgggggacc agccctgaggc cagaggcccc gctcctctc  
96301 gctggagca cagggagctg ggccatgggc agcctgaggc cagaggcccc gctcctctc  
96361 agcagcacc tcaggtatgg cagtccccac ctgccccca gaaagtgtcc tcagaagact  
96421 ctggggcctg gcataagatg gggaaggagg ggagatacga catcagtgca acaggcagct  
96481 ctaggaccca tgggtgccct ataagatcct ggggtgctgga tccacactaa ggtgtaggca

96541 cacacacaca tgcacactca cacacccata cacacacata cacacaacag cttgccagtc  
 96601 tcagggtgaag catgtccett ttccaggaag gagtctgtcc ttctctggag ccacacatag  
 96661 tectgccctg gtatgtctcc cctctatcca gaaagggtggc tagggccaga ggtgggatgg  
 96721 agccaggctc cagcgtgtcc agcagaatgc tctcactgtg ggaatcaaga cccagtgcat  
 96781 tagcttgccg gagctgttgg gatacaggct gggcgcccta aacagcaggc atttaccatc  
 96841 tcacagttct ggaggctgga agtcaaaatc gaggtgttgg tggagttggg tccttctggg  
 96901 ggctgtgagt gtgagggcag gggctgttcc cggctctctc ccttggttg tggatggtca  
 96961 tcttcttctc gtggcttcat gtgggttccc tctgtgaatg cctgttcaga ttctctcttc  
 97021 ctataaggac aatagtcata ctgggttaag gcccacccta acgacctcat ttaatttga  
 97081 ttacttctgt ttgtaaagac cctatctctg aataagggtca tgttttagagg tactgggggt  
 97141 tgggacttca acatataaat ttgagggtgg ggaacataat ttactccata acacatgatg  
 97201 acaggccaca cacatgttct tgaacagtta catagtccag gacaggagga catctctggc  
 97261 agcacaagat ccagcgcccc tcccctgggt cctggctttg gagccccaag ggcccgggga  
 97321 gctggtggaa tgggtggtca gtctgggtg cagagcccca ctggacagca ggtctaggtt  
 97381 gggcttagag agtcaaaggc cagagcccca ctggacagca ggtctaggtt tatectggaa  
 97441 tctctctagg aaaggggcct gcttggcagt tcccaagacc tcaggcagaa gtagaggag  
 97501 caggaccctg aaacactgga gaccaaggcc ccatcttccc cctaggtgtt gctctgggaa  
 97561 cagcagcgac tggtctggcg gctccccgg ggcagcaccg gggacactgt gctgcttct  
 97621 ctggcccagg gtgggcaccg gcctctgtcc cgggctcagt cttccccagc cgcacctgcc  
 97681 tcaactgtcag cccagagacc tgccagccag gcccgagtcc tctccagctc agagacctc  
 97741 gccaggacc tgccttccac cacagggtgag accgggagga ggggtggcggg tggaggagg  
 97801 ggctcggctg cacgagtcca tgtgggtgtc ttgggtgtcac ttgggacatt ttttagaggc  
 97861 acagagtgtc tagccttgtt agggccacgt agtacctatg gagcacatgg aacagctggg  
 97921 tattgcattt ggccgatgag gaccaaggct cacgaaatct aaggtagaaa gcctgtggg  
 97981 aaatagcaag tggtagtcaa gccaggataa gaattccagt ctectgcaa tgcactcagc  
 98041 ccttttaaaa aatgatattt attactgttg ctctgcttgt aaaaagagct cagaagtatt  
 98101 tttagacattt tgaagagtac agaaaaacct aagaagaaaa gaaaaatcac caaccagtat  
 98161 cccaccaccc agaagtaaac cctctgaaat tctgctgtat ttcagtccag gctttgttct  
 98221 ggccatattg acatgtacag atgccatgaa cacatgaact acgttttcta tctgtctta  
 98281 cttagttaac atattatgaa tcttcttgg cataattagt ctttaaaact gagagtctca  
 98341 tagtatttca ttaatgtatt tcatttttac tgagggatcc cttatcagtt agacatttag  
 98401 attatagctt atttgaattt ccttatgcat aaatcttccc tcatgcttgg gattatttcc  
 98461 caaggttcac tctaaagaag tagcattccc gggtcacatg gtgtgagcat tttgagagtc  
 98521 gttggtgtcc tagacgcaca gaaattgacc ctcccaccg caatgagcag gacctcttc  
 98581 tgaagacttc ccacgggtca gactgaata gtcacttctc caaagctgga tttgtctatc  
 98641 acatgggtca gtgtcatcgt gggcttctta gctcccgtt tgggggtttc ctagggaattc  
 98701 ttttccctcc tgetgcccct tggtagcttc tctgggttca tgacacgtgt gtgagatgct  
 98761 gtacgttagg cctcatgctt tgetctgagc acttgagggc ctggtgctgg gccctcagat  
 98821 cctgggccac ccagcagtcg tgtccgcatg tgggaaggcc gtggctctgt ggcagccatg  
 98881 ttggtctggag ctgtgttgat gtgttggctg ctgccacctg gggaagtgtc tgggcgtgtg  
 98941 tggacagggtg tgaggggctg gggctggggg aggggcagga tgaaatgcag gctgtgtgg  
 99001 gtgtgagggg tgtgtacccg cccggctcca ggtgggtgcc tgggtgtgag gtgctggcgt  
 99061 gttctctgca gccaaaggcca tggggcgtga ggactccctg ggtccccgt ctgaccttg  
 99121 ctcctgcagg gctgatctat gactcgggtca tgetgaagca ccagtgtccc tgcggtgaca  
 99181 acagcaggca cccggagcac gccggccgca tccagagcat ctggtcccgg ctgcaggagc  
 99241 gggggctccg gagccagtgt gaggtgagga ggcgcgggtg gggcccagg aatgggtgga  
 99301 gggaggagtc atgggagggg aggggtgggg ggccctgggg cccatgagag atgaggggca  
 99361 catgggtggg tgggtgatggg agggaaaggg cgagcatgag ctcagagctc tgtgtcccc  
 99421 ttttcagtgt ctccgaggcc ggaaggcctc cctggaagag ctgcagtcgg tccactctga  
 99481 ggggcacgtg ctctctacg gcaccaaccc gctcagccgc ctcaaactgg acaacgggaa  
 99541 gctggcagg aatggcctag tgccctgtc tccccatgcc agcttacctc acccagctcc  
 99601 catgcactcc tgtctcggct ctgcccgcgc agccagcctc ctctgcacc ctggacgtcc  
 99661 ctactccagc ttgttgccaa gcccctctc agcccacctc cactctccc ttccatattt  
 99721 ctctcccca atactaccc ggccctgtc tctgggtccc ctgctccctg ttgggcaaaa  
 99781 ggtgagagat attcacgtg acgtgggctg ggcctctccc cgcagggtc tggcacagc  
 99841 ggatgtttgt gatgtgccc tgtgggtggg ttggggtaag tgtgcccagg ggtctcaggg  
 99901 gggcgttgcc agggctctca gctctctcc ctgtgggtct cccaggccca gcccctgcag

99961 aacctctgct tgttgtggtt ctgccagaca ggttgagcca gggacttccct gaggtgcccc  
100021 ctgcagcagg aagctccttt tggacaggcg tgtctcggac ccacagtctc ccccgaaatgc  
100081 ggagtcacag ctaagccttc ccctagaagg tgtctggttag atgttgagtg aggtttcagg  
100141 agcagggccca aggetggggc ttaggatcat ctctcccttc aaagaccccc atgactgggc  
100201 attggccgcc aggetgctct gtctgctctt aagtggcaag ttggggtaac tcagcctggt  
100261 cccagacct tgggctgcct ggtgtgacat cacggtggtg cttccggtgt ccttggcgat  
100321 cccagcactc cccactccgg gacatagccc caaactccgc tcgcgagctt tgcttcctaa  
100381 gtccctaccc ctttgtgaag ggagcttccc gctccctccg gctcagctct cctcgcttaa  
100441 cactatccct gcagtagttt ctcaagcaag gtgtgtagag gcaggggatg gaggcctcat  
100501 tccggaggga aagtgggagc tgtagctggt gggggacttt gggagccagt cagtgcctta  
100561 ttcacaactt cccatttctt gccactttct ggtttttcca actgttgttg cttctgtttt  
100621 ctccctccctc ctctccctct ctgtctttct ctctctctct ctttctccag cctcttgcca  
100681 ctctctctgc cttctctgcc tctcttggtc tgcctcgccc tccccatctc cccatcatgc  
100741 cccccggccc ctccctagcc ttgaggccca gggactgggt ttggggggcc tcccagcctg  
100801 ggctaggggc cctgagtggg agacagtggg gcagacggcc cctccagctc cgaccctccc  
100861 gcagggcctg agcagagtca gctggggctt aaaacccctt cccggcccaa accccaagtc  
100921 ccgcccaggt aacgccatgc cccctccctt gaccggggag gcaggcgtga tgctgccagc  
100981 agagtgtctg ccagataatg ggctggtgct gggacttaag ctgggaaaaa gtcagtctgg  
101041 gattggggga cacaggaggc cttgcttttg ggcggtgggg cactggggag gcagcactgt  
101101 ctgcccagct ccctgcccct ggggtccttg ccgtggggtg gggaccaccc ccttggggcc  
101161 tggctcctgt gtgaagcctt ggatgatgcg ggccctgact ctggctcccg caggtggaca  
101221 ctgacaccat ctggaatgag cttcattcct ccaatgcagc ccgtggggcc gctggcagtg  
101281 tcaactgacct cgccttcaaa gtggcttctc gtgagctaaa ggtaggaggt ttgggttgaa  
101341 ggtggacaca ccacaaagga ggaagcagag agagattgct acagggtttt ggaggggaaa  
101401 ccaggcatcg cattcctctt agagattgct acagggtttt ggaggggaaa ttgagggtct  
101461 tgggaaccag gttgagattg gaactcttgg ggtacgttca tgcagctgtg ggtcagagct  
101521 gtctgttgat tgacaagcat tctttctttt tccagaatgg ttctgctgtg gtgcgccccc  
101581 caggacacca tgcagatcat tcaacagcca tgtaaggcta aggggaagacc ttgggtggat  
101641 gaggtggggg gcaagccccc aggaacttcc ttcagggaca ttctctcttc tcccctgagc  
101701 tttctcaggc tgggccaacc caggggcttg gggaggtgag ggcagtgtga gagaatgggc  
101761 tggcaggacc tgtctctcct tccaggggct tctgcttctt caactcagtg gccatcgctt  
101821 gccggcagct gcaacagcag agcaaggcca gcaagatcct cattgtagac tgggtagggtg  
101881 cctgtccgta gcaccctcca attcgagagc cctgggggaa aagccctgag cctgatgtta  
101941 gagatggggc ttcattgtctt agttctgcag tagcctctct gagcctcagt tccccctgt  
102001 gtaaaatttg ggtgaagata acaccacat cacagttagg aggcctagag gggatggcgt  
102061 gtgggaacgc attcagccat cgcaaaccct tgcaacagat aggagctgtc atttgagtgt  
102121 tgtcttttga cctctatttg cttcttttgg cagatctagt aatttctgca tttctgtac  
102181 aggtagtgtat gataagaata atagcagata acatcagtag accactaatc acatccagac  
102241 actgatggtt ttacacatga tggatttaac cctgactata acccacttta cagatgaaag  
102301 ttagcacaga gagattaagt aactcacaca cagtcattcg taagtcatga gatggatttg  
102361 aacccaggcg ggttagctct agagtgttg cgtttaactg ctaagctatg tccctcttgc  
102421 actgacagct gtgtaagaga catttctaag cagaagttga gagcgggtga ggacctttgc  
102481 acacttgagt tcccgcatgg tctgtgagt cgagtgtagg gccagctctt cctacgagg  
102541 gatggggctg ggccctcgtg acctgcccct ctgtaaccga gcttgggttc tgatctctc  
102601 ataacttcat gactttatgc aagacagagt ggttccctgat atgtgtaacc ctgaaccctt  
102661 cctctcctt gccactaacc ccatgtccac acagttactc tctcaggtgg gctggcctga  
102721 gattggggaca cctcctctcc ttcaggatct catattacag ccagccctgt ccagcacaga  
102781 gaggccgagg ttcagagccg ggcagtggat tacgtggggc cactcgaccg tgtggcttta  
102841 ggaacccag gttcctgate ccagtctagg gtccctgacct cagaatggcc actgaccttg  
102901 aaaccttctt aacctgtcct ggcccccatc tetctgcctt cctaatcgc tgccgtctc  
102961 cctacacagg acgtgcacca tggcaacggc acccagcaaa ccttctacca agacccagt  
103021 gtgctctaca tctccctgca tcgcatgac gacggcaact tcttcccggg gagtggggct  
103081 gtggatgagg taaccgcatg tcagggccac atcttccagc ctcatgacc tctcctgac  
103141 acttactctg cctctgtcat gacgagctgt gtgatcctgg gcagactgct gagcctctct  
103201 gatcctaaac tccccacct ggaaatgggg aggcctggat agctgggctg gcagctctaa  
103261 caaactggtg tccccctctt gggactctgc tgtcctcatg tctctcttgc cctctgtttt  
103321 ccaggtaggg gctggcagcg gtgagggctt caatgtcaat gtggcctggg ctggaggctc

103381 ggaccccccc atgggggac ctagtagcct ggctgcttcc aggtacgtgc tctggggggc  
 103441 cagagggggca agtccaccct ctcctgtccc ttctcccaag agcaccaggg gggaggtgat  
 103501 cagttggatt gtcagcctgt ccccaccagt tcttagacat ttaggtgaa cgccagttag  
 103561 aataggacaa acagagagaa gaatgcaaaa gtcaaagggt gctttgcaaa ggcatacatt  
 103621 accgagagcc aatgtcaaac tgattgctgg caggtgggtg gtggagttag cagagctggc  
 103681 acatttagtc agagaaggct gccactctat ttgggaaaag agaattctgg aaatggatct  
 103741 tcaaacactt ttctggagtt atctccatga cagctaattc tacgagagcc ctgggctgga  
 103801 gttectggag tcttctcaga gcccagggtc atgaagaaca cccaagcagg cccagaggtt  
 103861 ggatcagggg tagaggaagg cagctggggg ggggctgga agaggagag gatgagagaa  
 103921 ttagaccagg tggcgagaa cctcagagga cctagtgtgc ccctactcag ctctcaagta  
 103981 gtgagttagt ggggtgtgtc aactcagtc aaaggactga gcactgttag tccctgaagc  
 104041 tttgtgacca gagtccatct ccgcaaggct gtgagattac cctttccctg tggctccggc  
 104101 cactgcaccc cacagatgct tgcattgaca cacacacatg cacacacaca tggcacaca  
 104161 cactcctctt tcatteccctc tgggtgtcca tcttggctc ctttctgcct ctttctgctt  
 104221 aagtecccta gggggctgag tcttaggct gtgtgtgcca gggacatggg tggccagcca  
 104281 aggtcaagga ggtcagagaa atctgccagt tgtgctggg cactgggagc cttggagtcc  
 104341 taagaacagg gtgccccacc gcaaagtgtg caggaccgcc cctggcaacc ctgcacagta  
 104401 cgatgatcgc cacttcttgt gacctcacag gatagtcgtg atgcccacg cccgagagtt  
 104461 ctctccagac ctagtcttg tgtctgtgtg atttgatgct gctgagggtc acccggcccc  
 104521 actgggtggc taccatgttt ctgccaatg taaggagacc tcagctgagg gggacgttag  
 104581 ggacagagag ccaggcgggtg cggggagttg ggaggcactc ccaagtcaga aagggaaggt  
 104641 ggcagtggcc agcccagggc tttcagcctg aggactggag tatggcagct ggtcctgaaa  
 104701 ttccccggga tctcctagcc gagcacagcc caagcccttt ctcaggacca ggcgggttca  
 104761 ccacggaggg cttgaccagg tcatacccat ggggacttaa gtccagttag caggaagctc  
 104821 agccgtggga ctccccacca cagctgggtt gattccaggt gggctggcag ctctccaga  
 104881 ggaaggggag agagaagcag cactctcaga atagagggtg gccacagggc ccagagtaca  
 104941 gaaagaagag aggggtgtagc tcagtgaaaa agacacaggc tagagtcaat gacccaagtt  
 105001 caggtectac cttgctgcca cttactagct gtggggcctt tcccaggcc cttaacctcc  
 105061 ctgagccttg agtgaagcat actagtaggt tttgtacgac attcaatgtg aaagcacttt  
 105121 ggaaatagtg attgatacat gtgagtcatt ctttattagg gaggaagcaa gcagggaagc  
 105181 cacaggggta gagaacaggg tcacctctcc actcccgcct cteccatttc tcccctcca  
 105241 acctctaggt tttggataca tgacgcagca actgatgaac ctggcaggag ggcagtggt  
 105301 gctggccttg gaggggtggc atgacctcac agccatctgt gacgcctctg aggcctgtgt  
 105361 ggctgctctt ctgggtaaca ggggtgagccg tctccctccc ccatccatgc tctgtcagg  
 105421 caggtgaagc cggtctcag gactacccaa ggagcaggca gatgggatgg gacaggggtg  
 105481 gagtggccaa gctgaaaca aggtaggcga agcgggaagc tctgttccaa gttaggtcca  
 105541 ggcagcatct cctggcctag gttaggtgtg cttgtggcta gaaggctggg gcccctgggg  
 105601 tgggagttag ctgggcctgt ggggtccctga gagactgggt gctgatgtac tgtttctat  
 105661 aggtggatcc ctttccagaa gaaggctgga aacagaaacc caacctcaat gccatccgct  
 105721 ctctggaggg cgtgatccgg gtgcacagta agtgtggaga tgggacactc gctgagctca  
 105781 gactgaagga tcttggtggt accctgcccc accgtggcca gatcctaggg cttccgggtg  
 105841 cagccagggt accctgctgt ggtctggagt aagattcctg tgagtgaacc aggcagcaat  
 105901 ggtgagcacc cccagtgag ggggtatcct ctgagccccc ccgatggagc cagcagggcc  
 105961 taccagacag tggccctca aggtagggac tggcctccat ctctagcgac agccctagac  
 106021 cagggccagg tcaagagcaa cactcaggcc ttgtttgcca aaaggcctgg tcccatccc  
 106081 tcccctcagt cctggccaca ggcgtctcag gagctctgct ggcttggggg ctgctcttg  
 106141 ggataacccc cacatttgta aagtacttta aattttcaac ttcaactcaa catctattga  
 106201 gcatcttatg tcaagacca taatctatac tagggataaa aatgagtaaa atagattccc  
 106261 atatcaaggg ctgggtaggg gagccgtgat gtctttacat aatggtaaag acatggctga  
 106321 ttctctttac ggtgggtgcc ctacactga gccagattcc aggcagtggt tctcacagc  
 106381 agcaggcagg aggagcatc tctggcctg ggcacccatg cagagcggcc gtgggtatgg  
 106441 tcagttctcc catgttgtt tctgcccacc tcccaggccc tctttctctg agtgctgggc  
 106501 tgagcactgg tgggggctgt gtttaagtgg gaggcccgag cttggggctc tgggaggtca  
 106561 ctgtgacaca gacctgtct gcaggcaagc aggtctcct gatgctctca ggagccccgc  
 106621 acctgtgggg aatgagtcaa aggtggcctt gcagccacag gggatgagag aaaggctggg  
 106681 cactgcttag gactccctca cagccatgtt gaaccactc tgtgtaccct gtcaggctgt  
 106741 gcgggagtgg gagcgaagtg aggagagggg caggtggggg agccgaccct aagtggagga

106801 caggccccgt cctccggggc cctgggacct agacaccaac ctcaatatcc ggtctaggac  
106861 gcagtgtgga ggggcttgct ttctccaacc ctttctgacc tggcatctta cccaggttaa  
106921 atactggggc tgcattgcagc gcctggcctc ctgtccagac tectgggtgc ctagagtgc  
106981 aggggctgac aaagaagaag tggaggcagt gaccgcaact gcgtccctct ctgtgggcat  
107041 cctggctgaa gataggtaat gccagacccc tggccctggg cccacagcct ctccaccgt  
107101 tcattctctc ctgcttgaag accccgggtc cgctatgcag ccacccaac cctcccaggc  
107161 ttcttgacca gggttgagag gaagcttagc taaggccctt gctgcagccc tgggtctcca  
107221 gcattcccacc cttgtccctc cccacaggcc ctccggagcag ctgggtggagg aggaagaacc  
107281 tatgaatctc taaggctctg gaacctctg cccgcccacc atgcccctgg gacctggtt  
107341 tcttctaacc cctggcaata gcccctctt ctgggtcttt agagatcctg tgggcaagta  
107401 gttggaacca gagaacagcc tgctgtctt gacagttatc ccaggagcgc tgagaaaatc  
107461 cctgggtcta gaattgggaac tggaggagac cctgagagga gacgggctgg gcggcgaccc  
107521 ccacagggtc ctcgagaaca gattctcccc tccagtatgg gccctggctg tggccccat  
107581 tctcagggac tgcacagagg aggactggct ccggctccgt cgggctcacc cttaaccact  
107641 attcctggct ctgcaaaccc cagactttgc acacagcctc aggtctccaca cagaaatgtg  
107701 aacttggcct cagacaggct ggcccttctt aggtctctagg ggctaggggg gagtggggg  
107761 ccaagaggtc ccatattctt gactgcaggg gtatgctctc tcacctgctt cctcagacga  
107821 ctctggaagc ttccctctac cactgggcac tgagacgaag ctccctgaca gccgagactg  
107881 gcagccctcc atctgggtccg taccctgcgc agaggccccc ctacatcaac ctctggcga  
107941 tggcctgggt gagcagatgg gtgctctggg agtctctgtc tctctgatcc aatggtgcca  
108001 aaccttctat ctccccaga agcgcagcat acccctggga cccctcggcc actgccact  
108061 cggggagcct tctctgtttc tggggcctcc cccaccatag ctctgattec caccaccat  
108121 aggagtagcc tgactgaggg ggaaggggtg ggagagaaga tacagacatg gaggagggga  
108181 ggctgctctg gcaaatgtct caagcctttt ggggtgcccag gcctgggggc aagaaggaaa  
108241 atgtgtgtga gcattgtgtg gactgagggc tgtgtgtgag cgtgtgtgtg agtgaggcgt  
108301 gtgtgtgtgt cttctctagg acccaccata cctgtgtat gtatgcatgt tttgtaaaa  
108361 aggaagaaaa tggaaaaaaa tctgaacaat aaatgtttta tttgctttaa aagtgcctct  
108421 gaaagggccc cccagaagtg agcagtgcgc cgtcaagcgg gtgtgcaggg cacacagctg  
108481 cacggcacag tgtgggtctg agtactgcc ggaggaggga ccagggtggt ctgggcccga  
108541 gccctttaa caatctgccc ttctgccc caggaagaa cccattctga acacaccctg  
108601 gctgtccctg gctgccccac tttgggtgga caaagaggag gcagccctgg gctgagtcga  
108661 cagagaccag cctgatatg gcaggagtgg ggggtgggtg ggggagtggt aatacaggag  
108721 ctcagcccca gctcaccacg gcacccccga agagtgtgta ctcagacaca cctgggttta  
108781 agtccagct gggagctcag gtaagtcaaa tctctctctg gggcctctgt ttatcagtag  
108841 aaggctccag aagtatacac tgttgatggc tcttcccgc tctgatgcac catgctgat  
108901 taagcataca ctgagcctag aagagagaag ggggtgaggc caggcctgga caagctcacc  
108961 cagcctaagc agagagggaag ggcagggct ggcagcacct gcctttgtgg ttctgagct  
109021 gtccggtttt tccagcagga agaggagcac ctcattacct tagacctgg ccaagctcct  
109081 ggcagcctgg cagagtgtga ggggaagagg gctaaccct tccccatctg gcctggcctc  
109141 tgggtgtggt acaccaaact cgcaggggt tgggttagct atggcctgg gcacccctg  
109201 cctggctggg gtgtgctaga gagaggaaag ctggaggagg agagctgagc tgggtggtac  
109261 cccatgccag gaggccaag gcaagagggc ctgcagcccc agagatactg actctgtccc  
109321 ctgccctcca gggcacaact gaactagcgg aatggcttaa tcagatagct cgagaactgc  
109381 cactaccact cctccctgc cactcctcc caaagtcac ctgttcccgc aagagtccca  
109441 cctcacaagc aaccaccaga ggctgataca aatggcgcct gtatttttgc taaagtga  
109501 gtgacacaga taaggcaag agctgagggg caggacacat cagatgggaa gggggagacc  
109561 gtgcaaatg gcagtctaac agaaaatcat cctgtacca acagccctt cctcccaag  
109621 ttaggtgagc cctgggcca gtgtatgggc agaaaagcag atttgtgtcc ttcagaagg  
109681 aaatgtaaaa aggtgaaagc tctagtgtga gggcagtgag aggggctgga gtgggagaga  
109741 aggtctctcc tggccgggtg tctgggtgca gcaagggcac tctgagaagg cagaatggaa  
109801 acgcagggtc ggaggggcat ggggtacagg ttgggggctc ttccagcct ctactatgt  
109861 gcccccttcc ccaaagccct tacaggggca gaagcacatt ccccgtagc ctgagctctg  
109921 cctcatttgg gaagtcttct ggggtgtatg gatgcctgtg tgtgtgagtg agatgggtg  
109981 ggggcccagc ctatctggct ctatgcacact catgggagac cagctctggg aacaacagga  
110041 tgggggtgct ggatgggggt ttaagaggtc tctgctagat atttctgaac tgacctcccc  
110101 aggtgcccac cctggccttg ggaagagagt gcctagggca gcggggatgg aaaccttgc  
110161 ctgcagcata ggtccaggcc tcatggccct acaccttgac ctcttgactt tgttgcctg

110221 gccttaagta caaagattcc tcaactgcgtg ctaagaaaac agatccaggc cgggcacggg  
 110281 ggctcacacc tataatccca gcactttgga aggctgaggg ggggtgaatca cctgagatca  
 110341 ggagttcag accagcctgg ccaacatggc aaaaccctgt ctctataaa aacacaaaaa  
 110401 tttgccgggc atgggtggcag atgcctgtaa tcccagctac ttgagaggcc aaggcaggag  
 110461 aattgcttga acctgggagg cggaggttgc agtgagctga gatcgacta ctgcactcca  
 110521 gcctgggtga cagagtaaga ctccatctca aaaaaaaaaa aaaaagaaaa aaaaagaaa  
 110581 gaaaagaaaa cagattcatt tgaaaaggtc taaagctgcc ctctggccag gctgatgagg  
 110641 agcaacatgg caggatcccc cactcgtcct gctgtgtatt ttctgccaca gttctggggg  
 110701 gacagcttcc tgggagacca cactcgtcct gctgtgtatt ttctgccaca gttctggggg  
 110761 caccaggggg tgggagtagc ctctcccaac atctcagagg ctgagtcag gtcctaaggc  
 110821 ccccccaggg tgcagagacc tcacccctcg ggtagaaaat cgtgaggat gctgatgtca  
 110881 gcaaagtcag cccggtagcg gtgggcatag aggctgagca ggaaggccca cttgaaggaa  
 110941 atgaagctcc agacgctgga gaggtagtag ctggtggggg ctgtgaggcc tgcagggaga  
 111001 gaagtaccga cagtgaactt ggcaggccct gccctcggc tctgcaccgg ccacaaggcc  
 111061 agggccaccc tcccactca acatccctgc aacgtcctgg cagctgaacc aacccttcag  
 111121 aaagacactg tgatggagg ttttagagcca tgggtcccaa ctttttggc accagggact  
 111181 ggttttgtgg aagacaattt ttccacaaaa accttgggat ggtttgggga tgaaactgtt  
 111241 ccacctcaga tcgtcaaaca ttagatcatc agggggcacgc aaccctcgca tgcgcctcac  
 111301 aacagggttt gcgcttctaa tgcccgcgcg tgacctgaca ggaggcagag ctcaggcggt  
 111361 aaggctcgct tgcccctcac ctgctgtgtg gctggttcc taacaggcca cggaccacta  
 111421 ctgttccaca gcctggaaca gtagaacgga gctggggacc gtttttagat attccagggt  
 111481 tttcaggcag gaggccgtgg ggattaggga agggcagggc tggccaatca caggctctga  
 111541 tcatecactc cgcttttgtg acaaatacc taggccacct ccaacctgct ttagttagca  
 111601 tcagactccc ggaagaagga cctctggtta ttccagcca cagccaccag agggcgctcc  
 111661 catcccagag ctgagcacag actaatgggt cccaatatca ggagtgttg tatgggctat  
 111721 gcaactgctca agacttcaca tcagtttcat agaattccacc caacttgcga ggtggggact  
 111781 tgttttctcc acatgaacca taacaaaacc cgtgtccggg gagggttaagt aattcaccca  
 111841 gtctcttttg aggtaacctg tggaaacagg atgggaatgc tgctaaaatc cccgctgctg  
 111901 tccctcccat gccctcttcc cctgggaccc gccctcactc tgatgccggg tgatggccag  
 111961 caccgaggaag gtgcagaagg cagcgatgga gacggccgag aagaggacgc ccacgaagaa  
 112021 gaagccgcgc agccccttga gccaggctct ccaataatct tgcatgtaca tcacgtgcgt  
 112081 caccaggacc cacagtgcga gcacccctgc aggagagaca catcagggcc catccccagg  
 112141 gtgctccaga gccctgcaga tccactagac caggcctatt tgcataagaa taccaagaat  
 112201 atggctcttg ctctcattcc ctcatagaat ggagttttcc ttttcggagg ctgtgatctc  
 112261 agaagcaggg aagagactga gctgcctgct agtaagccca acattagaga aacctgcaga  
 112321 aatacaaaaac cctaccatcc tctctgattt tattttgttt tggaaaacat gaatatctct  
 112381 cacaaaaaatg ttatgttaat tcatgttatt tttagtatta ctttaaaatg ctaaaaaatg  
 112441 ttctaacttc taatatagta tatatcaata gctaaaactc acatacataa aatttgcag  
 112501 gagtttctact acttttcaag aggataaaag gatcctgaaa accagaaagt ctgtgcctca  
 112561 gcagcccagc ctgctttctg gggacttgcc actgtctacc ctgagggccca cagagcaggg  
 112621 aagccatgct cctgccccat gctcctctcc caccagccc tcagaggcca cagtctcaaa  
 112681 gtcacaaggc ctgcagggct cttcccaaac tgcttgagtt ggttttgcag gatgaggagg  
 112741 tccagccatg aagactccag ggccacccaa ccctgagtg gccttattgt tcttggccag  
 112801 acctcatgcc actccctcca ttttgcggca aagggcaggc catcaccacc tgcaccgctc  
 112861 cccaccccca ctgccccag ctttctctgg gcctggcctc tgcgcctggg tggacacttc  
 112921 ctctaggatg ccagctgcca cccagccaat acaatacaaa acaacctctc gtgccaggca  
 112981 gtgctgctg gtgcagccca aagagtggaa caaatatcaa ctccattggc aagggtccgg  
 113041 gcaggggcgt ggatcccgcc aagggaacaa tgagggaagg ggcagagcca cctgcaggct  
 113101 ctgagctggt tgggttgcaa ggtgtgggce actcaggccg ctgcatccta ggagttagga  
 113161 ggcccttcca aaaggcagct gcacacatgc cactcagagt agttacaaa tgtgcacagg  
 113221 aaggataagc atctggttgg ggaagtggt tatctctggc aatggagaca aggaagggaa  
 113281 gttgatgggg cggtgggggt ggggaagtgc tttgaatcta tgggaatcta tgctattttg  
 113341 tttcttaggc tgggtgggaa atctatgcta ttttatctac gctgttttct caggctgggt  
 113401 tataagggtg tttgttaaat catctatcct ttttgtgtg cctaaaatat ttcataattt  
 113461 gtttaagggg gaaaaaggca ggaggaagct tgtcactgtg gagctatgct ctggttacca  
 113521 gctcagaggc tgtcccagtt tggctgtccc cagacagtc agtgaggaa aaaaaccat  
 113581 gagactccaa gccaaagaa caggagcctg gcactgctgt gtcccaaagc cttggtgttt

113641 ccacatctaa aaatgggttg gccaggggt cctgccagtt taggtaactg ggcccagggt  
113701 tctaccctag tgagggtgaa ggcctacca gectacagct tccctcagcc cctgccaccg  
113761 tttgaccccc tgaacactct cccagctttg cccctgccc cctccactct tccctcagggg  
113821 gtgggggcct ggaatgtggg tccccctcct actgagatca ggggtggcca ggacaagcat  
113881 ctgttccctcc ccacctagtc tggatgtctg agtggggccag aggtggacag gacaatcatc  
113941 ctgcagcttc ctcttacctc ctacaagatc tggattttta taccagccac ctttcacaga  
114001 agtccctccc actcctcaca tgtgtcccat gttttcattt gaggggagctg tttggtttat  
114061 aaagggccct ggaacaagg ggtgttgtca ctgagcacac tcaaggagca gtctgatggg  
114121 cactgtcttg gaacagggtcc cctcgccttc tgtctcctcg tgccacagag ggggtgggga  
114181 agttgagctc taagatcctt tcccactcaa agattctaga agccagcttg ggagaaaaat  
114241 aaggtcagaa caattcctct gtgactcag agtttctggg ttaggaaatg ctgaaatagg  
114301 ggctgtgaa gatgccatct cttagtccac tggccacgat ccagtgggtc cccaaaactc  
114361 ccaccccat gtacatgcac ataccaaaga gggctgaggg caggaggag aggaagacag  
114421 ccatttgggg gcgttttggg cctgttctt tgtaacaac aggcattggt taccacctc  
114481 tcacctccc tcaaccttgc tccaggcct gcacagagge cccccctcca gataaacaca  
114541 catcaagtgt ggaggcagge ctgtgccc cgccttggct cccaccacc tctggggaag  
114601 ggagctctcc accagcccta cccaagggg tcaactgaagg agatggagcc cctcactggg  
114661 cccctccac acatcaggca ggaggcaatg ctgggggttg aatggacagg tccccaatcc  
114721 tggggactct aggaagcctg gttataaaa ctcgggggtg aatggacagg tccccaatcc  
114781 cacttggtg caagcccaca ccagaccaca ccgttgcctc atcctactg tttcaaggag  
114841 cagagccct gcttagccat gtgagcttat tggctcacag ccgataagct aagggttaagg  
114901 aaggcatagg gtagggcggg gaaagcatcc ccagtggctg ggctggagggt gaggagacag  
114961 gagacaccg ggggatccca cagggtaaat gcagacaaga aggacactgg gcttaggtca  
115021 ggccccctta ttccttctta ggaggaagac agtcctggag cccagggtc cttgctcaca  
115081 gctcacctgg gaaaaacata gagctgttta ttgtgtttt cccaggact cccacagcaa  
115141 tcttgggtct actaaaccca gagcaagagt ttgtgtttt cccaggact cccacagcaa  
115201 agccagacca ggtagatcca acccacact gcccgcctcc ccaggaaagc cagtcttgct  
115261 tctgccactg cttttctcca aagccacttc ttcgaaggta cccatcagga tgggagaggg  
115321 tatccccacc cgtgaacact ctgcccacca gaccagggg ctccatgact ctgtccaga  
115381 aactggcaca tccaatcagt ccttgccctg tccaacacag gagaaggagc atgtggggc  
115441 tacccttggg tgactcagca gattctgagc tataaaacgc tgagtcagaa gtagggtgct  
115501 cacacgttag ttaatctgct gacactttac ccccaaaaga ggaagaagggt tgactggcca  
115561 cagacctct gagaactcac tcatgtggg gaaggctcga ggcccaggct tggcaacccc  
115621 tctccctgcc accatccacc accaccacta ccaagcagtt ttggctctc cacagccact  
115681 gtcaaagatc agaccatcag ggagatacca ggaccctact ccagctggct gctgcctag  
115741 cgagctgctg ccctagcgag ctgctgcct agcgcctctc tetgaaggca gctccacagc  
115801 tggcctgct cataggccaa gggaagcctg tggggaggga gagagggcag agttgggtcg  
115861 gaagaaaacc ccaggcaact ccctagagta taagaaagaa ggccttttcc acagccctct  
115921 aggaggcagc tggagactca gggagtggg agcactgcaa gatttcagat ctggaggga  
115981 gtcagatgtc ttttggggac atctcctccc actcctaata gatgaggaaa ctgtggcca  
116041 ggatagggtc aaacggccag gtagggttca cctccacttg taccaggcca gactcaacac  
116101 aaccagctga gatcccagge tggccctccc tgetcatcct tctcttgct tgggtctcg  
116161 caatgcaatc atagggtct gacgcgcct tccagagggg aaagcaacag ggccaatagg  
116221 aaacaaaaaa gtggcaggga gaagtgaacc ttgacaaaaca tggagggtgg cggggtgcag  
116281 tggggaaagg aactagggtc ctgtagataa cgcgagaga tgggcccagt gtcctcagga  
116341 tcccacaggt ggtgaggcag ctgggcaggc agagaacacc ctagccaggg tgccatccc  
116401 ccttcttgg tgaccagtg ctttgttggc attgtgtagg gtggggccct gtatgccct  
116461 cttctaaggc attaacccca cctcatgtg cgactctacc cagggatggc actcagcact  
116521 cctgtggca gtgagtaaat tagttatttt tagttattcc atttagggt cttttggccg  
116581 aggatttttag taatggaata taatcatcat atgtaaaagt attatacgta ttttcttccc  
116641 aaagtccctt cccacacata ttatttcatg tagctgtgta atcccgggta agcaatttat  
116701 ttaacttcag gcctcagttt ccttatctgt aaaaatggaca ttgcttaaca tagtgctga  
116761 tgagactaat gtaaggatta aatgaaataa ggggaagcagg ttgcttaaca tagtgctga  
116821 cacatagaaa gcattttttaa aaatgttaga aagtagagat aatattttt atcttcatc  
116881 caattctatg gcgcagagag gttaaactgc gagcccaaat gtgcacaaca aggagcactg  
116941 gtcagccag agcccccac agcgcaccga tgcttccct tccctcccag aagcacagaa  
117001 agggcggtg gcctgcagga tttggcagag cttggctgag gagccacagc agacgggtag



117061 caaaaaggca ccaacatggg tggaaagaga atgtccagtt tctatgagat ccctaacgcc  
 117121 gtectccttg tgggtctcag cagagggctc tgcgggggag cctcttgaa ggaggagat  
 117181 gggtctcccc agccaccct agccctcttc ctttccact tcttccctct ctgccctcac  
 117241 ccagcaccca gggaaggggc gcctgggggg caggggateg ctcagaacaa ccgtgtgtgt  
 117301 gtgcgtgtgt gtgtgtgtgt gtgtttggg ataggaggcg accagcgccg cgggcgcgcg  
 117361 gaggggacac tgcctggggg caactgggcg gagggcgaca ggcagtgtgc cgtgacagat  
 117421 aaccggggcg gcgcggcagg tctgtgcagc cggcagtggc gggcgtcg caccgccagg  
 117481 tggcgcccg gcgggcatcg ggtctcagag gcaccagga atgccagga gcccgggccc  
 117541 gcgtggggcc tgcgcgcgc aaccgctgtt ttcagtaaa cactccacc gctcgcggg  
 117601 gaagcgccgc tcgcggggag cgtcctggag cagctgacgg cggcgcccc gcagccgcg  
 117661 acccgcccc gcgcgcccag cgtcccgggg tacttgcgag ccctcccatg gcccggttc  
 117721 ccggctgtcg gtagaccacc gtccagacga ggaagatgga gaagccggcc acggagctga  
 117781 tgccggagta ggcgcgcgcg aggcgagct gcagcctgga cggggccatg gggctgcggc  
 117841 gccggggcg ccgagggcg gcgcggccga gactcacagg tgcaggggcc ggcggcccc  
 117901 gccggagccg cgggagccgc cagagcagcc cctccccgc cggagggcg cccgcgccc gaaccgcaga  
 117961 ccagcgccgc ccgcacagc cctccccgc cggagggcg cccgcgccc gaaccgcaga  
 118021 cgccacgccc gctttgcgaa gctgcctgt cgtttgggg aatgctgcta aaaaggcgga  
 118081 ttccctggcc catccccaga cccgcctgt ccggattgtt ggaccttgga agggaccgga  
 118141 aatatgcctt tatacgagcg aaccgcgagg attaaaaatc ttacctctg agtacgatgc  
 118201 gtattttcgt taaaatttaa aattaaaatt tcttgtaaa aattaatagg taaaacttaa  
 118261 gaaatattag agtacgctgt gaatagaatt ccttcgccc gtctctctat caaccaggtt  
 118321 cctccccacc atatcgca atgtttcttc acacactaaa gtctgggaa ccttgcgacc  
 118381 atcaccttct gactgcaaac attctataca ttctatctc acgcacagct cccacaaat  
 118441 cctactttt ttttttttaa acagagtctc actctgttgc cggggcagga gtacagtggc  
 118501 gccatcatag ctccgcatec tccaacacct ggattcaagc aatgctctca cctcagcctt  
 118561 ccaagcagcc aggactacag gtgtgtgcca ccacgcctgg ctagtatttt ttgtatttta  
 118621 tttttgtag agatagggtc tcgctatatt gccaggctg gtcccaact cctggcctca  
 118681 agctgtcttc ccacctggc ctcccaaagc gctggaatta caggcttgag ccactgcaac  
 118741 ggacctcacc tttcctttta tcagcacaag ccttatect ccaaaccct caccctgacc  
 118801 ctccgggatca taccattgta aggaagagac agatctgtag caggagggca ctgagctccc  
 118861 acgtgagccc agcttccggc cgggagctgg agggaaaatc ccagcacaat aacaagggt  
 118921 ctgccacagc actaaggatc cacatgggga ggcccatcat atacctgcac aaaacataac  
 118981 caataccctt tgcattagtt tttttgtgt gtgtgctgcc gtaacaaat accacaaat  
 119041 tactgattta aaataacaca aacttattat tattttacag ttctgtaggt caggaatcca  
 119101 aataatggtc tcaactgggt aaaatcaagg ggacatcagg ttttttttt tgagacggag tctgtctctg  
 119161 tctaggggaa aatcagtttc cttgactttt tcagctcact gcaatctctg cctcctgggt  
 119221 tcaccaggc tagagtgcag agcctccga gaagtggga ttacacgct ccaccaccac  
 119281 tcagtgagtt ctcctgcac agcctccga gaagtggga ttacacgct ccaccaccac  
 119341 acccagctaa tttttgtatt tttagtaaag atggggtttc accatgttgg ccaggctgggt  
 119401 ctcgaaactc tgacctcagg tgatccgccc acctcagcct cccaaagtgc tgggattaca  
 119461 ggtgtgagcc caccgtgccc ggccgcttt tccagcttct agagtgaggc taccacatg  
 119521 ccttaactcc ctcttctcc ttttccctt taaggacccc ttttatcaca tcagcaaat aaatccctt  
 119581 aggataatct ccccatcgca agatccttaa ttttatcaca cgtggacatc tttgggggccc  
 119641 gccgtggaag gtgacatatt cataggttct gggatgagga cgtggacatc tttgggggccc  
 119701 attattatcc caccaccac acccctctg gaacataaac ttcatgagca gggacagtgc  
 119761 cagttttgtt cacatcaaca tctaaaagca tgtctggcat ataataaccc cttaataaat  
 119821 gtttgttgaa taggtgagtg tgagtgaatg aaggtaagaa taaaataaaa acaaaagcaa  
 119881 ttatacacia ggaatctaga cagggtgtgc ttaactgcca aacaagggt gtaaaccagt  
 119941 gtttaagcaca tttgcctcac tctagaataa tctgggagct tctttaaaaa taaaaaaata  
 120001 aaccagccc caccctgccc tattaattt tgaatcttgg agtgtgtatt ttaataagaa  
 120061 gtgatgtcaa ggctgtgagc tcagcagcag cctccttta ggagctgccc gtggagagtg  
 120121 agtgctgtgc ctgtggagga gggagcaagc cccgtgggtg ggagtgcatt tccatggatg  
 120181 gcttcagagc tggccaggat ggacagtact ccaggcagtg ggaaccgcac gtgtgatggc  
 120241 gcagagggaa gaaataaagc ggccgctttg ggaaactgta agtcgtttgt ggctggaatg  
 120301 tcaagtttga aggtagagta gcgggtttgg agattagaaa ggttctgaac ataaagggcc  
 120361 ttgcatgtc tgtaagaag gctgtcccc tccccctggg gctgggggag aaaactcaca  
 120421 attctgtgtt ttagaactat ggccagagta atagagtga ggcgaactgc ctgtgaaaca



120481 ctagaagcag agagatgagt tggacaaatt tcacccca gtgctttaat taccaggte  
120541 ttaaaatgga gactgcagta acacctactt caaagtgttg tgatgaggag tgccaggag  
120601 agtgcctagc acatggtaga tactcaataa atgtcaggaa gtagaattag tagcagcaga  
120661 aggctgccat ggcaagagag gatgaggggc ttcagagctg gtccaggcag aagcagagag  
120721 aatggaagag acgaaactgc ttcaagagct atttcagcta tctgaacct aagggtcagg  
120781 gagaattcat tagctgagca gacagaagga ggagagcaaa aatattatga gtggacatat  
120841 taggagtatg ggagagcagt gagcaagctt gctgtgctgg aaagtgagat tgcgcaagaa  
120901 aagaaagaga aataattatg taacagtagt actagaccag gttgtacaag gctaaggcca  
120961 ggcttaaaca ttttttaaat tgtggaaaca atgaagagct attgcagagc attagactca  
121021 ggtgggggtc gaggcctagc ttcaccattt gctgtgacct tgggcaagtg cccctaactc  
121081 acagatgtcc aatccaattg actttctgcc tgggaagaaa tattccatat ctgcaccctc  
121141 cataatggtg gccactaatc acaggtggct attgaatact tgatatgtga ctagtgtgac  
121201 tgaagaactg aatttttaaat tgtatttaaat ttaaattaat ttaaatttaa tgtatttaag  
121261 tttagtgtat ttaatttaaa ttaatttaaa ttaatttaa ttaatttaag tagctgcaca  
121321 tgactagtgg ctactgtgtt agcacagcta gaccaggac tctgtccct ccatctgtac  
121381 acagggaatg atgatgaaac atcacaggct tgttacaag atcgagatat attgagataa  
121441 tacactcaa gtgctcaaca cagtaattca acaaattatt gctgctgctg ttgaaattgt  
121501 tattgttttt attgaacagg gattgcatga catacgccaa gtcttaggaa gattagttag  
121561 actataatat ccagtttagat ttgatggggg aaaattgtag aggataaagc attcacaagg  
121621 ttatttcagt ggtaagggtg gagagaatta agatcttatc cagtgaagaa ccttgagaat  
121681 gggaaagaat ggaatgattg ttgagccata aagcacatgg gtgtgcacca ctcatacaca  
121741 tcttctcata tcagcttcct tccaaggat tctcagagag tacactccca acccagccca  
121801 ggacagacac tactacgacc cctacaagat gcacagccat tctccctgcc tgcgccagaa  
121861 actactagtg ctccacaaca cacaccaaca tttgtgtgtc tctttctggg cacagtacct  
121921 cccaaatttg aactacactt cccagcttcc ttgcagtcaa acggatgcca tgggatcagg  
121981 ttctgaacaa tggaaatgaag gcagaagcaa tgtgcgccat ttctaggctg ggctcattta  
122041 aaaatcttcc atacaacctg cattccctct tcccattctg tgacaatttt agaggccata  
122101 tgtaccacat aatggaaaga acctaggctt gaatgaatgg atggagcaga gctaccctg  
122161 tcccctagac cctcactgga ctatag

THIS PAGE BLANK (USPTO)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
30 November 2000 (30.11.2000)

PCT

(10) International Publication Number  
**WO 00/71703 A3**

(51) International Patent Classification<sup>7</sup>: C12N 15/11,  
A61K 31/7125, C07H 21/00, C12Q 1/44, G01N 33/50,  
C12Q 1/68 // A61P 35/00

(21) International Application Number: PCT/IB00/01252

(22) International Filing Date: 3 May 2000 (03.05.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/132,287 3 May 1999 (03.05.1999) US

(71) Applicant: METHYLGENE INC. [CA/CA]; 7220 Fed-  
erick Banting, St. Laurent, Quebec H4S 2A1 (CA).

(72) Inventors: MACLEOD, Alan, R.; 67 Hallowell Street,  
Westmount, Quebec H3Z 2E8 (CA). LI, Zuomei; 22 Oriole  
Street, Kirkland, Quebec H9H 3X3 (CA). BESTERMAN,  
Jeffrey, M.; 51 Gray Crescent, Baie d'Urfe, Quebec H9X  
3V3 (CA).

(81) Designated States (*national*): AE, AL, AM, AT, AU, AZ,  
BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK,  
DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL,  
IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU,  
LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT,  
RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA,  
UG, UZ, VN, YU, ZA, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent  
(AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent  
(AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU,  
MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(88) Date of publication of the international search report:  
19 July 2001

*For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.*



**WO 00/71703 A3**

(54) Title: INHIBITION OF HISTONE DEACETYLASE

(57) Abstract: The invention relates to the inhibition of histone deacetylase expression and enzymatic activity and, in particular, to the inhibition of a specific histone deacetylase. The invention also relates to compositions comprising antisense oligonucleotides and methods of using the same to inhibit a histone deacetylase. Also disclosed are methods for identifying a histone deacetylase involved in induction of cell proliferation, and methods for identifying compounds that interact with and reduce the enzymatic activity of such a histone deacetylase.

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/IB 00/01252

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N15/11 A61K31/7125 C07H21/00 C12Q1/44 G01N33/50  
C12Q1/68 //A61P35/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

BIOSIS, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 35990 A (JAMISON TIMOTHY F ; HARVARD COLLEGE (US); TAUNTON JACK (US); HASSIG) 2 October 1997 (1997-10-02) page 5 -page 7 page 27, line 13 -page 31, line 30 page 48, line 15 -page 59 page 82 -page 84 claims --- -/--	1,11-15, 18-20, 26,31

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*G\* document member of the same patent family

Date of the actual completion of the international search

22 March 2001

Date of mailing of the international search report

03.04.01

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentaan 2  
NL - 2280 HV Rijswijk  
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax (+31-70) 340-3016

Authorized officer

Andres, S

# INTERNATIONAL SEARCH REPORT

In tional Application No

PCT/IB 00/01252

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	YOSHIDA M ET AL: "POTENT AND SPECIFIC INHIBITION OF MAMMALIAN HISTONE DEACETYLASE BOTH IN VIVO AND IN VITRO BY TRICHOSTATIN A" JOURNAL OF BIOLOGICAL CHEMISTRY, vol. 265, no. 28, 5 October 1990 (1990-10-05), pages 17174-17179, XP000616087 ISSN: 0021-9258 cited in the application the whole document	26,31
A	WO 96 31600 A (HYBRIDON INC) 10 October 1996 (1996-10-10) the whole document	8-10
A	TAUNTON J ET AL: "A MAMMALIAN HISTONE DEACETYLASE RELATED TO THE YEAST TRANSCRIPTIONAL REGULATOR RPD3P" SCIENCE, vol. 272, 19 April 1996 (1996-04-19), pages 408-411, XP002038743 ISSN: 0036-8075 cited in the application the whole document	16,21, 23,26, 28,31
P,X	WO 00 23112 A (BESTERMAN JEFFREY M ;MACLEOD ALAN ROBERT (CA); METHYLGENE INC (CA)) 27 April 2000 (2000-04-27) cited in the application the whole document	1-22, 35-39

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/IB 00/01252

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:  
see FURTHER INFORMATION sheet PCT/ISA/210
2. ☒ Claims Nos.: 33 34  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

## Continuation of Box I.1

Although claims 11-13,16-17,23-25,28-30,35-39 (as far as in vivo methods are concerned) and claims 14,15,18-22 are directed to a method of treatment of (or to a diagnostic method practised on) the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.

## Continuation of Box I.2

Claims Nos.: 33 34

Claims 33 and 34 relate to a histone deacetylase protein inhibitor which is characterised solely by the method for its obtention. The claims relate thus to a compound defined by reference to a desirable property (HDAC inhibition). Therefore, the claims cover all compounds having this property. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search is impossible. Independent of the above reasoning, the claims also lack clarity (Article 6 PCT). An attempt is made to define the compound by reference to a result to be achieved. Again, this lack of clarity in the present case is such as to render a meaningful search impossible. Consequently, no search has been carried out for claims 33 and 34.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 00/01252

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9735990 A	02-10-1997	AU 2990597 A	17-10-1997
WO 9631600 A	10-10-1996	AU 5325696 A	23-10-1996
WO 0023112 A	27-04-2000	AU 6519499 A	08-05-2000